

SURGERY
ORTHODOX AND HETERODOX

SURGERY ORTHODOX AND HETERODOX

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INTRODUCTION

A DIFFICULT question in the professional life of any surgeon is the policy he should pursue with regard to reprints. If he broadcasts them he is thought to be a charlatan, if he withholds them a churl. A surgeon needs reprints for three legitimate purposes

- 1 To send to surgeons and societies at home and abroad, when requested to do so, for their reference library of reprints

- 2 To exchange with others interested in his particular branch of surgery, whose publications he is, in turn, anxious to obtain

- 3 To give to his house surgeons and registrars, to present to them his surgical creed, his aims, and his problems

These are the needs. The quantity of reprints that must be ordered to satisfy them can be decided only on an estimate of their probable demand, and few people are less competent to make this decision than their author. He may think he has produced a masterpiece and order reprints in hundreds, only to find that nobody wants them so that they litter his shelves for years. He may order a few score, or rest content with the pittance doled out by the publishers, to find himself forced to refuse demands coming in long after his stock is exhausted. He may ask for none, and then realize that he can satisfy requests only by buying copies of the journal—an expensive and short lived expedient.

I have here collected some of the less technical addresses for which I am still asked, though they are out of print, and by pruning or rejuvenating them have made them into a volume for my friends. I have tried to cut out repetitions, but this has not always been possible as the mind is a self repeating mechanism. The two chapters on War Surgery (17 and 18) contain similar ideas and many similar paragraphs, but as one expresses the outlook of the first year of the war and the other of the last, I have left them as they stand.

I am very grateful to the Editors of the Journals in which they first appeared for permission to republish them.

Those who have helped me are too numerous to mention by

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SURGERY: ORTHODOX AND HETERODOX

I. RELIGIO CHIRURGI¹

IT has been remarked that any man presented for the first time with an assured audience—the returned exile, the young lover, the star, theatrical or athletic, new risen to stardom—proceeds to pour out the story of his life. The most persistent autobioloquist of literature is the ancient mariner, who, lacking an audience, impressed one from a group of passers-by bent on urgent business. Though I have not their excuses, the same desire overtakes me when I am given a few blank columns which I may fill unguided, uncensored, and anonymous.

I should dearly love to say that I had decided to become a surgeon as soon as I was safely past the engine-driver stage, that I was one of those small boys who love dissecting dead frogs and caring for sick animals. But I must confess that I grew up without any ambition other than to be comfortable, and that I found myself at the age of seventeen prepared with a good classical education, but with no definite aim in life. I felt no vocation for the church or teaching, the professions to which such a training appears to be the natural preface, and I chose medicine chiefly because it gave me the chance to accompany my best friend to the university.

Thus far I found myself in the company of many of my contemporaries, started on a medical career with no undoubted calling and no particular end in view. I have no regrets that I took this step, one that I should recommend to-day to any youngster similarly perplexed, to any parent worried by the lack of clear inclination on the part of his son. For the course itself cannot fail to interest all but the incurably lazy, and it is indeed remarkable when we consider that the work is harder and more prolonged than that preparatory to any other profession, that it

¹ This article appeared anonymously in the *Lancet*, 1936, II, p. 283

debars the medical student during his university years from many athletic and social activities that are open to his fellows studying the humanities, and that it is punctuated by the recurring anxiety and frequent disappointment of examinations, how few of those who have entered the course by chance and without enthusiasm are afterwards bored or discouraged. Yet the training gives the undergraduate, now interested, a succession of opportunities to turn aside into paths which he has explored sufficiently to learn their direction, which lead him ultimately to a vocation other than medicine. Chemistry and physics are studied long enough to give a taste of their quality; each offers scientific interest and commercial employment. Biology, anatomy, physiology, and pathology, all hold out careers in research or teaching. And when the wards are entered, not only is the interest, hitherto scientific, heightened and animated by its human contact but the choice of a career with medicine as its background is almost unlimited. The qualified doctor can embrace the whole of medicine in his work, choose one of its larger subdivisions, or confine his outlook to one limited aspect. He can work alone, in double harness, or as a member of a team. He can take the risks and savour the delights of individual enterprise, or seek the secure tramlines of whole-time salaried employment with an ultimate pension. Should he turn to the plum stones for guidance, he will find that soldier, sailor, rich man, poor man, apothecary, thief, are all open to him. He can go to sea in the Navy or Mercantile Marine, he can enlist in the Army or the Air Force; he is wanted on Mount Everest, in polar expeditions, or in the less dramatic exploration afforded by colonial service; he can enter commerce, the law, the church; he can be a journalist, or a schoolmaster; he will find Parliament and Government departments in need of him, he can devote himself to the social round or to social service. And in all activities his training is with him as an interest and a permanent background, offering him further opportunities should those he has first embraced prove illusory, and a certain, if meagre, livelihood under all conditions. One career cut short by accident or disease, he can, in middle age, find another of equal interest and scope. He can satisfy his own aspirations and play a part useful to his fellow men far beyond the age which closes other careers.

What are the circumstances that decide which of these paths a young man shall enter, why does the surgeon embark on a career that promises certain hard work and an uncertain reward long postponed? With regard to myself, I can say with truth that I was not enticed by visions of the legendary income earned by the successful surgeon, I wished to make a living, but I had no desire for commercialized practice and no expectation of making a fortune. My choice was the inevitable one of a young man who has the normal combative instincts of the healthy male, and whose outlook on medicine is humanitarian rather than scientific.

The tendency among students in my time, and it has not appreciably changed to-day, was to regard surgical appointments as the plums of hospital work. Before qualification we all applied for dresserships to the surgeon who was the idol of his generation, qualified, we sought to become his house surgeon, and ultimately his registrar. The great man's dresser was marked out for distinction among contemporaries, his house surgeon had established supremacy in his year, his registrar was already picked out for success and future honours.

Yet apart from this ignoble, but very natural stimulus, the very surroundings in which he works in the surgical wards must necessarily influence profoundly one whose mind is practical rather than philosophic and whose choice of medicine was not the inevitable result of a spiritual urge. The medical ward is as cheerful as planned environment and the constant efforts of sisters and nurses can make it. Human kindness shines in the mutual help and sympathy of the sick, but the patients are ill, not transiently, but for long periods. Some battle their way to health, some are slowly brought to a condition of tolerable equilibrium, to lapse all too soon after they leave hospital, very many are suffering from incurable, progressive, and often painful diseases. Everywhere are seen bloodless lips, cheeks pale or coloured beyond the flush of health, eyes sunk and abnormally bright, marks of suffering borne too long to be concealed. Cheerful words there are, and laughter, but they do not ring true. The doctor is rarely able by his own decision and action to cure, he can only help the natural resilience of living tissues to effect their own repair, plan future conduct so that the process of decay shall run less rapidly, or relieve suffering. His part is that of the

investigator, the judge, too often that of the hollow comforter to those he cannot help

The surgical ward, on the other hand, is cheerful, happy, often boisterous. The patients are for the most part healthy men and women, whose useful life has suddenly been interrupted by some crisis, some accident or grave infection. The course of action is clear, the treatment definite and immediate, and when it has been effected the crisis is past. The sick man starts to improve and knows that he is getting better. Day by day he sees the time coming nearer when he will be back at his job and living in the old happy surroundings of his home. Overworked, perhaps, and underfed in the past, he revels in the plentiful diet and unaccustomed rest, enjoying them all the more because they bring him back to health. He rejoices himself, and makes it his duty to reassure the fresh arrival, and to cheer the despondent neighbour with good humoured chaff.

Such surroundings are the daily lot of the surgical dresser, resident and registrar, and he not unnaturally feels that, if he can make surgery his life's work, he will be happy in the knowledge that he is doing, and doing good. It is true that cancer stands beside him as a spectre, but, except in special hospitals, cancer never looms largely enough to cloud the prevailing light of optimism. Even in this disease, the prospects of surgery are rosy enough to keep the glow of hope alight. Severe operations may end fatally, but most often after some unusually hazardous attempt to eradicate advanced disease, where death is better than the life that would have remained, otherwise surgery can offer a reasonable prospect of cure, or of a painless end long postponed.

The perfect job in life is one which offers steady employment while the faculties remain active, reasonable remuneration, a succession of tasks sufficiently varied to demand constant care and provide constant interest, freedom from dictation or interference, and a knowledge that the work is necessary and beneficial. Most branches of medicine satisfy some of these demands, but few, other than surgery, satisfy all.

It is on the score of usefulness that so many trades and professions fail to secure full marks. The world may provide a living for crooners, advertising specialists, cosmetic experts, and

motor salesmen, but do they go to bed in the happy certainty that it would be a poorer place if they ceased to be? And are there not even large branches of our profession which, judged dispassionately, are unnecessary to mankind or even harmful?

The saturation of the continents, an inevitable consequence of the industrial age, has brought a new philosophy which, though it may be repellent in the crude form of Hitlerism or Mussolinism, nevertheless pervades modern thought. For an indiscriminating acceptance of the sanctity of human life we are substituting a reverence for its quality. We distinguish between living and existence, and prize those men and those breeds in whom we recognize outstanding attributes, just as we prefer in our gardens a few good blooms to a green expanse of weeds. Yet much of our acknowledged policy is a negation of our inmost ideals.

When our political friends wish to compliment the medical profession, and seek statistical proof of our skill as a text for their eulogies, they point to the progressive fall in the general death-rate, and the more rapid decrease in infant mortality. We are then obliged to confess, in acknowledging the tribute, that medicine is responsible in part only for the change, and that improved social and economic conditions and a steady decrease in the dangers which beset the helpless must also claim their share. But are increased longevity and wholesale survival in truth matters for congratulation?

The psalmist who said 'the days of our years are three score years and ten' wrote of conditions already civilized. If we infer the natural span of life from its duration among peoples who still live naturally, and from physiological reasoning, it is about forty-eight years. At forty-eight the reproductive power of woman ceases and of man starts to decline, metabolism is no longer regulated automatically by the needs of the body, but tends to run riot, usually to a deposition of unwanted stores, elasticity disappears progressively from the circulatory, optic, and intellectual systems. The human brain may function with mechanical precision up to four score years and ten, but in most cases the machine will perform only those operations, varied and intricate though they may be, for which it has been prepared in the first forty-eight years of building and tuning. It cannot adapt its jigs and spindles to new production, or work on unaccustomed fuel.

Judges, writers, and politicians often do their best work in their later years, but it is a more polished version of their earlier performance. It is rare indeed to find men like Masaryk and de Morgan entering at sixty new and phenomenally successful careers. By the power of his brain alone can a man over forty-eight justify his continued existence to himself and his fellows.

If age may be but labour and sorrow, infant survival is also no theme for hasty rejoicing. Death in any form is sad, but in infancy it is the extinction of an entity that has not yet learned to suffer or rejoice, or had time to impress its personality on the hearts of others. If some must die, let them die then, and some must die, for we are not turned out like Morris cars from their production band, each perfectly formed from components already tested for imperfections. Many of us reach completion in some way or other defective, and the test comes when we are on the road. The new product is assailed by weather, bacteria, nutritional difficulties, and accident. The strong may fall under the bludgeonings of chance and the weak may survive if the shock comes lightly, but on the whole the most casualties will be among the poorer specimens, the most survivals are among the better. Preventive medicine does nothing to add to the fit—this can come only by eugenics, but it is disastrously potent to spare the weakly. And it is among these puny vessels where the hand of the potter seems to have shaken that the extra survivals will be found. We praise the effort which saves these poor little lives from instinct and not from reason, from good instinct because we all feel that pity for the weak and helpless which is an impulse of the herd, from bad, because we applaud any difficult feat, be it no more than rolling a pea up Snowden with a match stick. We commend the fighting spirit which saves a child of 18 ozs. weight by incubation and constant care, when we should shudder at such a wrong to the human heritage.

Perhaps the most sordid example of this worship of the bizarre is the adoration of quintuplets and quadruplets which is such a lamentable feature of the journalism of recent years. The woman who bears a healthy child in a humble home must struggle, rewarded only by her sense of motherhood fulfilled, to bring him to maturity. She who emulates the beasts that perish by producing a multiple litter, assures not only affluence for herself and them,

however puny they may be, but an increased sale to the journals that secure their portraits, and the patent foods fortunate enough to appear on their breakfast table

We may smile or shrug our shoulders, we should do well to weep For the prolongation of lives that have ceased to be useful and the launching of those that never can be, implies a suppression of lives we might welcome and a burden for the healthy that may in the near future become intolerable There are no countries for a new Columbus to discover, no invention which promises, like that of steam, to provide employment and support greater numbers on the old grounds The populations of the world are either stationary, or if increasing, finding the need to slaughter others to accommodate their surplus There is no room for a new being except to replace one that has died

A low birth rate is not merely biologically undesirable, but it is responsible for some of the most clamant medical and social problems of to day We may picture the prehistoric woman of twenty four, innocent of clothes beyond a few skins, but also free from fears or haunting doubts, absorbed in the moment and its round of useful and necessary duties, believing in something, living gladly, she has already had eight children, and will have eight or ten more, four have been eaten by wolves, two, less strong, have died from exposure, but the remaining two are sound in limb and brain We see her descendant to-day more clothed, but less happy, she is married but childless, and does not intend to have more than one, and that in eight or ten years' time when the diversions which lull the mother instinct are less amusing than now it will probably be conceived by accident, born by operation, suckled and weaned on factory products educated on a system, and alone, it will grow up weak in body and anxious in mind

The second evil for which modern conditions, and chief among them modern preventive medicine, are responsible, is a great and steadily growing army of those who are unable or unwilling to stand on their own feet, but depend upon others for their support Chivalry, the instinct to help the helpless, is one of man's noblest attributes, but chivalry called upon as a right and used unthanked is turned to resentment We admire the strong man fighting against adversity, and holding out a hand to

his brother who is fainting in the struggle, but we can only pity him who is condemned to battle for his family and dependants, his shoulders bowed and his movements hampered by a cluster of complacent parasites. The word parasite has unfortunately become a party slogan, applied to one whose lot appears to be more pleasant than one's own. But while I am tempted to agree with my young friends of the Oxford Union that a bomb exploded in the newest night club or on the beach at Juan les Pins might possibly do more good than harm, I have in mind those who cannot work rather than those who will not, the obligatory 'anergobes', to adapt bacteriological slang, rather than the facultative anergobes. The facultative strain comes usually from the healthiest cultures, they very often do far more work than we realize, are 'lathergobes' rather than 'anergobes,' and in any case can be made useful. But the weedy, the mentally deficient, the victims of hereditary disease are with us and unable to play any useful part, through no fault of anybody but the medical officer of health. They are permanent passengers, to keep whom the farmer must stay many hours in the field, the miner remain entombed when he might be with his own healthy family. The inevitable conviction that the hospitals, asylums, and colonies which are run to keep this race of submen not merely alive, but living under conditions of comfort and nutrition usually greatly superior to that of the healthy and useful labourers who support them, are an unfair burden on the healthy, and that medicine is largely responsible for this grave injury to mankind, is one that must lead many, as it has me, to the clean and hopeful field of surgical work.

The surgeon is sometimes despised by the intelligentsia of medicine as a mechanical craftsman. But though he be a hewer of wood and a drawer of water, he has the assurance that such services are useful to mankind. His work is concerned almost entirely with the restoration of the healthy to health, and not at all with the preservation of the unwanted to an existence that is not human life, and the degradation of that biological heritage that has been built up for us by aeons of evolution. Surgery may not require brains or bring a fortune, but it is the best job in the world.

moralist, scientist, or surgeon can be trusted to have as much learning as the last generation of his craft. This may seem a small commendation, but in real life, and especially in medicine and morals, it is, in fact, a great one, because over much the greater part of the globe there is no assurance to the public that a physician or a moralist has any learning at all. A man may set up as a preacher or a doctor of medicine without knowing as much of either art as an African witch doctor.

Thus, then, is the value of orthodoxy and the machinery of examinations, degrees, and associations which uphold it. This machinery makes certain that a doctor of divinity or of medicine does at least know something of his job. In practice, the public has no other assurance than the label provided by the degree—a degree granted by a committee of the orthodox for a knowledge of orthodox practice. I am not using the word orthodox in any derogatory sense, but as an exact description of the truth, because orthodoxy means, in this connexion, all that which is approved by the committee of experts responsible for the standards, what is heterodox this year may be orthodox next.

There is a much greater need for orthodoxy in surgery than in politics or religion, for the subjects of State or church share with others disabilities or dangers not usually very immediate, whereas a sick man bears an anxiety and responsibility and incurs a danger which is not shared and cannot be put off. He has his back to the wall.

Put yourselves in the place of such a man, and suppose that there is no established doctrine of medicine or orthodoxy. One friend tells him to go to so-and-so, another to some one else, and he has no better reason than opinion to choose one rather than the other, nothing better than opinion, because nothing better exists. To him and his friends surgery and medicine are mysteries deeper than Hebrew or English law. It would take him years to acquire sufficient knowledge to judge in his own case, and notice, also, that (always supposing there is no orthodoxy, no established machinery of tests, education, degrees) such a man would not even know where to go in order to give himself the necessary education. He must risk being

swindled by teachers almost as ignorant as himself, or by prejudiced pedants a century behind the times

Every one knows that this was actually the case of the sick man in surgery not so many years ago, and that it still is the case in a great part of the world. It is because of the misery and confusion caused by the absence of any orthodox standards that they were set up, and maintained, and are nowadays defended.

True, they are not so much valued to-day by the laity, because they have no experience of the suffering produced by their absence, but they are strongly maintained and defended by surgeons and physicians, who are well aware, by experience as well as the history of their art, of their value to the whole community. Every medical man has, at some time or other, to patch the sorry work of some quack, if it can be patched, and a very little imagination can tell him what was the state of the sick before surgeons and physicians were obliged to learn something about their profession. In fact, this experience is apt to make him too much the supporter of orthodoxy, too much the enemy of new suggestions, especially from outside the fold.

This leads us directly to the centre of the problem—how to devise machinery for testing the heterodox and for admitting the valuable parts of it into the body of the orthodox. Failure to solve this problem—which is as old as society itself—has destroyed countless kingdoms, churches, and orders. If no machinery exists, as in the case of the old French *monarchy*, there follows a decay, and the disaster called revolution, which destroys the good of sound tradition with the bad of self-satisfaction. If too much machinery exists, as in the case of the old Roman religion, which co-opted every new god as soon as he was proposed, tradition is swamped and society finds itself without any standards at all.

This problem, which has proved so difficult to statesmen and churchmen, is even more difficult to surgeons, on account of the special nature of their craft. On the continent the system of large professorial clinics, where the word of one man is law over decades, while assistants grow old and fixed in his service, tends to the perpetuation of local tradition and the cramping of true originality as against mere showmanship. In America, on the other hand, the orthodoxy of past generations is often wrongly

condemned on insufficient grounds, treatment is largely a matter of fashion, and each innovation is accepted as an advance, till a newer method displaces it

How, then, is the heterodox, the new, to be tested and admitted into the body of the orthodox, the old and tried? In practice, of course, new treatments, new discoveries, are continually tested and admitted by a dozen different routes, but nearly always, be it observed, from orthodox sources—that is to say, doctors, already proved orthodox, having made discoveries in their practice, bring them to the attention of their colleagues and pupils, either by writing about them, or teaching them, and after a general discussion, carried on for some years in the medical press and among medical men, they are either accepted and enter orthodoxy by way of the accepted textbooks, or are dropped

The objection made against this system as it works is that it does not work well. Critics point out that it is the original system, as old as medicine itself, that it is slow, erratic, uncertain. One discovery, by a stroke of luck, may catch the eye of an authority and be quickly tested, approved, and taught, another may be overlooked for years, or forgotten altogether

To the first objection—that the system is old and unbusiness-like, or, as one might say, no system at all—the answer is that it exists, like the British Constitution, only on sufferance, and *dum bene gesserit*. If anyone can devise improvements in it, or a better one, it will be instantly suspended by that fact. To the second objection—that it is uncertain—it may be answered that it is nowadays much less so than it used to be, simply because it is much easier for the medical researcher to get his results and suggestions published and because the profession, as a whole, is much more receptive of new ideas, much more critical, in the true sense of the word, and less dogmatic.

But the real and unanswerable defence is that, in the present circumstances, there is no other imaginable that could fulfil the necessary conditions. Let us recapitulate these circumstances and conditions. The circumstances are a lay world, ignorant of medicine, of scientific method and, to a very large extent, of the weakness of the uninformed human judgment against which scientific method has devised its mechanical safeguards—that is to say, a vast mass of population ready to be deceived by any

specious lie or self-deceiving wonder worker, and among this immense gullible crowd a comparatively small number of doctors, surgeons, and researchers, working singly or in groups, but divided from each other not only by space and opinion but also by language and great differences of outlook and education

It might be suggested that surgery, like statecraft, requires an international headquarters, like the League of Nations, or, rather, the Labour Bureau at Geneva, a central office, where all new discoveries would be demonstrated and all records filed. But anyone who understands the complicated nature of our problems will know what such an institute, to be effective, would cost in buildings and staff, with what suspicion and slights it would have to deal, and, also, how easy it would be for it to earn suspicion and deserve contempt. For it would be surrounded by the pit falls that bureaucracies dig for themselves—dogmatism, red tape, the superiority complex, in fact, those very perils of which dogmatic orthodoxy itself is the begetter. It would become a Royal Academy of Medicine.

But even if we suppose that such an institution could be devised to avoid academism, we have to admit that it does not exist yet, and it is not likely to do so till the nations of the world are able to co-operate on more straightforward and urgent matters. We are obliged, willy nilly, to continue in the present system, however unsystematic, and the main problem before us is how to improve it.

All institutions and systems depend chiefly on the men who work them. Give the British Constitution to Italy, Spain, Poland, America, Germany, Greece, Bengal, and you will find in a year or two that it has changed into something so entirely different that the very Speaker would not recognize it. The reason is that Italians, Poles, Greeks, and Hindus have different ideas, their environment, their history—in a word, their education is different.

If we want to know the cause of that dogmatism which assailed Lister with a bitterness and injustice which appear so inexplicable to us, we have to ask what kind of men were they who called themselves scientific, what kind of education and environment made them what they were? And we see that the education was empirical and dogmatic. They were told 'Do this! Do that! This is the way to operate for stone, this tumour is inoperable.'

They were trained as craftsmen, and not as scientific men. For the mark of the scientific man is an inquiring and independent spirit. He takes nothing for granted, he is ready for the most surprising developments, the most bizarre suggestions, and he brings to both—the orthodox that is accepted and the heterodox that has been proposed—the same critical judgment and the exact methods of practical test and trial.

The surest and, perhaps, the only means of combining the security of tradition with the life of progress is by the education of every medical student in the true scientific character. Let it be impressed on each from the beginning of his training that the doctor is not only a servant of the public, bound by the oath of Hippocrates, but a scientific man—one of the same profession with Aristotle, Boyle, Darwin, as well as with Arbuthnot and Lister—and that he cannot default in either capacity without injury to the other and danger to the honourable fame of his calling. Let his orthodoxy be that of Newton and Einstein and we need not fear for the progress of medicine.

I have dwelt thus far upon the abstract problems of orthodoxy and heterodoxy—problems which are more philosophical than surgical—and must pass on to consider briefly how these conclusions affect our outlook upon the questions that confront us to-day. A teacher of the last generation asserted, with considerable justification at the time, that the discoveries of the scientist become incorporated only after considerable delay in the practice of the clinician. It is idle to pretend that there is any failure in co-ordination between research and practice to-day. The wards and the laboratories work hand in hand, physician and biochemist, surgeon and physiologist, radiotherapist and physicist, bring to each other their problems for solution, their discoveries for practical test. Every branch of our art has been brought, within the last few years, to a higher degree of perfection by methods which have sprung from patient quest in research departments. Diagnosis has been enriched by cholecystography, intravenous pyelography, angiography and electroencephalography, prognosis by tests for the estimation of renal, hepatic, cardiac and peripheral vascular function, treatment by such products of chemical research as the synthetic endocrines, the antibiotics—sulphonamides, penicillin, streptomycin, and zero-

sponin—and the group of anti histamine substances, by immunization against diseases such as whooping cough and yellow fever, by the discoveries in radiotherapy, and the use of radioactive salts that have come in the train of atomic research, by the extension of intravenous administration to give blood, plasma, separated blood proteins and blood substitutes, and to supply the full metabolic requirements of the body in place of water, salt and glucose only, and by continuous advance in the pharmacology and physiology of anaesthesia. Pathology, dominated for half a century by bacteriology, has been re orientated by the study of virus diseases and the use of the electron microscope, and by research into the part played by deficiencies and by endocrine disturbance. The study of normal and abnormal metabolism has been launched on a new phase by the use of tracer substances.

Nor is it only from the laboratories that additions to orthodox teaching have been culled, cardiology has been rebuilt upon the work of a general practitioner, while orthopaedic surgery has taken manipulative methods from the bone-setter to employ them in its everyday practice. Medicine has never been more scientific in its training, more catholic in its scope, or more open in its judgment than at the present time. Honest heterodoxy has no difficulty in obtaining a hearing, nor, if it can prove a case in securing adoption. Rather are we too easily wooed, too susceptible to the blandishments of the new. The last few years have seen many examples of this mistaken eagerness. Heterodox methods, honest enough and sponsored by men of repute have been adopted and widely practised, only to be found worthless after an extended trial.

The operation of lymphaticostomy, exposure and section of the thoracic duct in the neck after ligature of its junction with the subclavian vein with the object of draining away toxins and bacteria from the abdominal cavity, was introduced some twenty five years ago for the treatment of septic peritonitis, and for a time attracted the attention of surgeons. About this time Voronoff was advocating the transplantation of heterogenous (Simian) testicular tissue for the treatment of sterility, and Steinach introduced a series of ligature operations on the seminal tract for the same purpose. The number of patients willing to give their all for the chance to bring back a vanished youth, and of surgeons

ready to cash in on this very human longing, ensured that these operations were given the widest possible trial. Some ten years later Wilson Hey advocated the operation of vasoligation for the treatment of peptic ulcer, believing that the secretion of hydrochloric acid could be reduced below the danger level by devascularizing the gastric mucosa to a degree just short of sloughing. Somervell adopted Hey's operation in good faith, and, under the name of Physiological Gastrectomy, practised it widely in Southern India. These operations have been tried and failed, and, the very reasoning on which they were based having been proved to be unsound, they have left no progeny.

During the same period the now classical papers of Hunter on the sympathetic innervation of striated muscle, and of Royle on the treatment of spastic paralysis by the operation of ramisectomy appeared. No surgeon who read these remarkable articles doubted that a new weapon in the treatment of one of the most common and crippling diseases of childhood had been placed in our hands, and many adopted and practised the methods with sincere enthusiasm and confident faith. But faith soon wavered, enthusiasm gave way to doubt, and doubt to profound disappointment. The results obtained by orthopaedic surgeons in every country except Australia, and the outcome of cases operated upon by Royle himself in England and America were disappointing, and the physiological basis itself of the operation was called in question.

Periarterial sympathectomy was introduced by Jaboulay in 1899 for the treatment of perforating ulcers of the foot, but is more often associated with the name of Leriche, who advocated it as a cure not only for gangrene but for chronic arthritis and many other conditions affecting the extremities. I may be imprudent in citing periarterial sympathectomy as another heterodox method which was avidly accepted by our profession without sufficient scrutiny of its credentials, and has proved unprofitable, but I know no discriminating surgeon who, recovered from his delight at a few apparent successes, has persisted in the method, nor any disinterested investigator of series of cases who supports it. Further, the physiological investigations of Woollard showed that there is no logical reason why the operation should succeed.

Yet to Leriche and periaarterial sympathectomy, and in greater measure to Royle and the operation of ramisectomy, we owe the opening of a new page in surgical history which is only now being written—the surgery of the sympathetic system. Though valueless in the treatment of spasm in voluntary muscle, ramisectomy, and ganglionectomy and pre ganglionic section which succeeded it, have proved very successful in the treatment of a number of morbid states, chiefly those of the vascular system. There is probably no group of diseases in which the prospect of surgical relief has become more apparent or been more warmly welcomed in recent years, or in which the indications for and the technique of operation have received more intensive study, than that which comprises the vaso-spastic diseases of the young, the degenerative arterial diseases of middle life, and hypertension in young and old.

Disorders that arise out of the conditions of modern civilized life can only be treated palliatively, since their cause cannot be eradicated except by a return to barbarism, a step some might approve, but few would advocate. No group of diseases has evoked a greater number of suggested remedies or provided a readier opening for heterodox ones, for where successive methods have failed, unschooled enthusiasm is the more prone to grasp at any that are new and credible. I would mention more especially in this connexion the right sided abdominal failures, intestinal stasis, coloptosis, caecal distension, and all the troubles in the right iliac fossa for which appendix is so often blamed without reason and removed without benefit. These are maladies of civilization, maladies of early adult life, and most commonly maladies of women. They are the outcome of a failure of one or more of the many factors which combine to keep the large bowel working normally under normal conditions—factors mental, muscular, and dietetic. In their earlier stages, before organic changes have taken place in the colon, before its walls have changed their structure and lost their contractile power and become fixed in some faulty place or posture by adhesions, they can be alleviated and even cured by attention to these factors. Many require more radical treatment, the old mechanism is beyond repair, and a new one must be constructed.

These chronic right sided failures are very real problems,

familiar to every practitioner and surgeon. The clinical picture which they present has been described by Lane with an accuracy and completeness that has left nothing to be altered or added by subsequent writers. But the record of their treatment by operation must give cause for profound dissatisfaction to any thinking surgeon. Probably more fortunes have been made and reputations lost in this field than in any other.

The operations which have been described and practised for the treatment of right sided colonic failures are many, but they fall, roughly, into two categories—those of fixation and those of excision. Both are attractive, for they appear to get to the root of the trouble, and operations of each type have been widely accepted and even incorporated into orthodox teaching: both are equally unsound. The operations for fixation are wrong because they run counter to the general orthopaedic principles governing the action of hollow muscular tubes—that they must be free to alter their position and diameter as waves of peristalsis pass along them. The primary fault in this group of diseases is not a failure in fixation, but a failure in propulsive power in the wall of the colon. Wide variations in the attachments of the large bowel, both in the direction of *greater peritoneal fixation than the average* and of *incomplete fixation*, are found in the foetus and demonstrated by radiography and at laparotomy in individuals who have never had any symptoms attributable to their presence. Failure is due to a deficiency in tone both in the wall of the colon itself and in the postural tone of the abdominal wall which supports the viscera, and while this deficiency may react earlier and to a more marked degree upon those individuals in whom the peritoneal attachments of the bowel are incomplete or abnormal, it will cause trouble sooner or later in all. Where tone is deficient, no artificial methods of fixation will hold the colon against its tendency to prolapse, indeed, by interfering with the wall of the bowel such operations are more likely to hinder still further its propulsive power and convert it into a passive bag dragged down by contents which it cannot expel. The occasional successes of colopexy are due less to the operation itself than to the careful regime and re-education of the abdominal muscles which have succeeded it. Failures are prevalent.

The results of colectomy are even more uncertain, and should

present a warning to all of us that we cannot scrutinize too jealously the basis of any procedure that is presented to us before we finally admit it to orthodoxy. In so far as these operations remove a damaged and useless structure, they are well founded, but in so far as they destroy the normal mechanism of digestion, they are unscientific. Intestinal digestion is controlled by the ileocaecal sphincter in a precisely similar manner to that in which gastric digestion is controlled by the pylorus. The sphincter remains closed till intestinal digestion is complete, the while movements of segmentation mix up the chyme, and absorption of digestible matter continues. After some few hours the sphincter relaxes, admitting what remains into the caecum, this residue contains a minimum of nutritive material. By colectomy this natural mechanism is abolished. The contents of the small intestine, as yet undigested, pour into the remaining colon, and their value is lost to the body, the putrefactive bacteria of the colon enter the ileum where they find abundant material in which to multiply, and where their toxins are readily absorbed, owing to the abundant blood supply and specialized absorptive function of the mucosa in this region. In the loss of the ileocaecal valve can be found the explanation of the ill results of colectomy.

Removal of the whole colon, as a treatment for intestinal stasis or any functional disorder, is dead, in its time it has probably done more harm than any other experiment in the history of surgery. Total colectomy can be justified only by the need to eradicate widespread progressive and incurable diseases such as polyposis or chronic ulcerative colitis. Right hemi-colectomy is equally wrong as a rule of thumb treatment for stasis, but it is justifiable when the propulsive powers of the bowel have failed and its walls have undergone degeneration. This degeneration is limited to, or most marked in, the proximal colon where the effects of stasis are intensified by the action of gravity. After removal of such a diseased and functionless segment, the contents of the small intestine are delivered to the large at its highest point, and can be passed on satisfactorily by the less damaged distal half aided by gravity. The operation of right hemi-colectomy becomes a safe and mechanically satisfactory procedure when the ileum is joined end to end to the transverse colon by a

double row of interrupted thread sutures—one of the most valuable of many lessons I have learned from Grey Turner

Closely allied to the subject of honest but mistaken heterodoxy is that of stupid heterodoxy—the introduction of new ideas that are merely the resuscitation of former failures, or are based upon wrong or insufficient reasoning. In my reference files I have a folder, the 'Chamber of Horrors,' in which communications of this nature are kept. One surgeon describes a case in which he performed ileocolostomy, closing both ends of the large intestine, and reports that the colon slowly distended till it occupied the greater part of the abdomen, and the patient finally died, no one who had read the chapter on exclusion in any text book of operative surgery would have performed this operation, or, having performed it, would have parted with the secret. Another writes of the operative treatment of fractures, illustrating his thesis with radiograms showing all the faults against which Lane cautioned his hearers in 1910. A third publishes a new operation for gastric ulcer, which is none other than the old one of gastro-jejunostomy with entero anastomosis, which was abandoned at the beginning of the present century because it was followed so frequently by jejunal ulceration, and which stands condemned by the experimental work of Mann. It is in the subject of gastric operations that callow heterodoxy is most rife, for the stomach will stand almost anything and almost any operation will do good for a time.

Since an enlightened medical public is so willing to embrace any new doctrine which is placed before it with the appearance of sincerity, heterodoxy may prove an easy way to notoriety, if not to fame. The reformer and the revolutionary are heterodox. We are, therefore, prone to accept the converse proposition—that heterodox opinions denote the reformer. Those who would acquire an easy reputation for originality need only trade upon this common fallacy, to be certain of a considerable following. Such spurious heterodoxy may be entirely unscientific and frankly dishonest, as chiropractic, or the Abram's box. It may be of questionable scientific parentage and of doubtful honesty, as is the case with rejuvenation and some of the surgical cures for deafness. More often the method is sound enough and honest enough, and only the proprietary relationship of its sponsor is in

question As in the world of industry the patentee often dies unhonoured while some commercial magnate waxes rich upon the proceeds of his invention, so in science when advances are made the glory and the profit of them goes to him who is first in the market place Within recent years the injection treatment of varicose veins, the renewed public interest in radium, and the rapid development that has taken place in chemotherapy, have provided opportunities for the more alert to adopt a parental attitude towards methods in whose origin they had no part, to write about them in season and out of season, in the medical press and in *The Times*, to rise from overdrafts to affluence, and from comparative obscurity to international reputations

Heterodoxy is the expression of initiative, ambition, originality, energy, a native orthodoxy the outcome of the reverse qualities The heterodox mind craves for individual employment, with the chances of fresh fields to conquer, for victory or glorious failure, the orthodox mind seeks safety—a settled future, regular hours, and a certain reward Therefore, specialisms are founded by the heterodox, but recruited from the orthodox, after the first generation they tend to become mutual admiration cliques, and to lapse into impenetrable standardization They decay The strata of geology are loaded with the remains of extinct specialists who concentrated all their energies on adapting themselves to one particular aspect of their environment, the environment changed and they, being unable to fit themselves to new circumstances, have perished and given way to a stock that meets conditions as they arise

Specialization is of the greatest value to surgery, not because each branch studies some small subject with greater intensity, but because each brings a fresh outlook, a new school of surgical thought, which can be applied with benefit to the rest of the art Plastic surgery has raised the ideal of meticulous care in the handling of tissues, orthopaedic surgery stands not so much for the correction of deformity as for a vision dominated by the study of physiology and the respect of function Such specialisms are born in the vision of some man, or group of men They rise, like waves upon the ocean, because some driving force raises the matter around it for a time above the surrounding level, like waves, they should agitate the common body while they are

moving and be taken back into its substance when the driving force is spent. Every surgeon should study the leaders of plastic surgery and return to his own work kindled with a new vision of technical perfection. The gospel of orthopaedics should animate more than the surgery of crippledom. For specialisms that remain apart tend to a dead and static perfection, having the semblance but not the reality of advance, like waves on the sand of the desert.

And now I would return to the main subject of my discourse. Fashions change, but truth is eternal, and what has been accepted by successive generations must be founded upon truth. Therefore, the main body of surgical science and thought is orthodox, and heterodoxy concerns rather the form of its expression. To quote Sir Thomas Browne: 'There is yet, after all the Decrees of Councils and the niceties of the Schools, many things untouch'd, unimagin'd, wherein the liberty of an honest reason may play and expatiate with security and far without the circle of an Heresie.'

Nor need we be ashamed of our orthodoxy, for orthodoxy accepted for purposes of smooth working indicates a stable and reasoned organization. The good surgeon is orthodox in his teaching and his public utterances, heterodox in his innermost conscience. Text books must be orthodox, monographs should be heterodox. We should only beware of an orthodoxy that is accepted without thought and without question, for that indicates an extinct faith.

The fetters of orthodoxy are ready to close round all of us, especially if we work at a teaching hospital. We cannot feed the young upon those untried enthusiasms that mean more to us than all the books in our library, for the ideas which we teach them now, however true they may be, however acceptable to future generations, must pass the scrutiny of the most orthodox of mankind—the examiners in surgery. We are happy if we can keep our faith while we serve as priests in the house of Rimmon. Orthodoxy is with us everywhere—at public discussions, at the meetings of our surgical associations, at the annual gatherings at which we congregate. It is only after the tumult and the shouting have died, when the captains and kings of surgery have departed in their expensive cars and some of the younger

spirits gather round cocktails, that men really speak their mind on surgical topics. Here lies the great value in the advancement of surgery of the small and intimate clubs and clinical societies, for it is in the exchange of theories labouring for expression, the outpouring of enthusiasms as yet inarticulate to a fellow enthusiast, that new ideas are born.

A barge making its way up the Thames from London to Oxford does not proceed at a uniform rate. At times it is moving forward, at times it remains stationary in a lock, but while it is in the lock, water is flowing in from the higher streams, till finally a new level is reached and a fresh advance is possible. Thus, by alternate pause and progression, it finally mounts to the highest levels. So the advance of knowledge must be wayward: the locks are periods of orthodoxy, the advances, of heterodoxy.

For guidance we have the advice of St Paul: to prove all things and hold fast that which is good. And the spirit of this counsel should pervade our attitude to surgery, the spirit, and not the letter, for if we try all things, we will do a great deal of harm to our patients in finding that which is good. Ingenuity, courage, and unconventionality are admirable qualities in a surgeon so long as they are not practised on others. Therefore, before we try any new idea, we must first ask ourselves: 'Is it reasonable? Has it a scientific basis? Is it safe enough to try on a patient, or should I first try it on myself, or in the laboratory? Has it, or anything similar, been done before, from which I can judge the chances of success or failure? If it has failed in the past, was failure due to a fault inherent in the method, or because some factor making for safety or success was unknown to the man who carried it out?'

If the answers satisfy us, we may proceed to practical tests: if these tests confirm our faith, we must still convince our fellows. We shall have our reward if we have been able, even in small measure, to add to the heritage of orthodox surgery.

THE TRAINING OF A SURGEON¹

MEDICINE has become a group of professions rather than a single one. The many committees which have considered the curriculum during recent years have all been harassed by this increasing complexity; on the one hand by the demand of fresh subjects as radiology, psychological medicine, and manipulative surgery for admission, on the other by the clear desirability of shortening the whole course, so that it shall encroach less rather than more on the school years and allow a continuance of that general education which is of paramount importance to the future doctor, and of simplifying it, so that it shall permit him during its study to keep his health and human contacts. A possible solution to these difficulties, one that may yet be forced upon us, is the projection of a relatively short and simple qualifying course, one that shall provide a common groundwork to all branches of medicine but a complete study of none. The examination following such a course would be the gateway not to practise but to a further period of postgraduate study in some speciality on whose completion a final test would give the right to registration and to practise in that branch.

Among such specialities, general practice would hold the most important place. The practitioner must be, as his plate sometimes announces, 'physician, surgeon and accoucheur.' He must know much of surgery, but he requires a different outlook and a different training from that of the specialist surgeon. He must be taught the clinical investigation of surgical cases, he must have a thorough knowledge of the surgery of trauma and sepsis, including such subjects as first-aid and the treatment of the septic hand, he must be familiar with surgical diagnosis in all its aspects, particularly that of abdominal emergencies, and with the possibilities of operative relief in all conditions. He needs no training at all in major operative surgery, and would probably be better without the haphazard introduction he now receives.

Routine operative surgery needs no more knowledge or skill

¹ A blend of two articles. *Lancet*, 1936, II, p. 338 (anonymous), *Lancet*, 1945, II, p. 229

than general practice, and should be no better remunerated, but it is a whole time job, requiring special training and constant exercise and study. It is, even in its simplest form, a subject for postgraduate study, and the practitioner who undertakes it without such study is a mere charlatan. He cannot, in this country at any rate, put forward the plea of necessity, for there are few places indeed where a patient cannot be placed within the hour under the care of a working surgeon. Such a man may be practising by himself in a small town, or may be a member of a large partnership, what matters is that he is a serious workman and not a dilettante. The training for such a post demands a minimum of two years' postgraduate study, which, should the simplified curriculum come to pass, would include a further course in anatomy. It would embrace resident posts in busy general hospitals, giving opportunities for the care of surgical cases, for training in diagnosis, and for apprenticeship in technical methods. Should his time enable him to take the fellowship and do a spell as registrar, the surgeon will benefit permanently from the experience, but without them he can do good journeyman work provided that he makes it his sole business.

But the training I have in mind is that of the man who is anxious or destined to be more than an operator, to do more than repetition work, of one who will train others, add to the store of knowledge he has received something of his own, and take his place in succession to Hunter and Hilton, Pott and Paget, Lister and Lane. Whereas a man can be fitted for routine operating in two years, if he is to become a surgeon he will require ten for his preparation, if indeed it is ever finished.

I hold two beliefs, shared I believe by the majority of my fellow teachers, which must inevitably colour my recommendations.

The first is that any plan for the future should be made in continuity with the lessons of the past. We are not trying to establish a new art, but to foster one that has grown up with civilization itself. Surgery has always been a practical art, the treatment of disease by manual processes, and the education of the surgeon, as that of any craftsman from the lowest to the highest, has been by apprenticeship throughout the ages. Craftsmanship and judgment cannot be taught in lectures or in correspondence courses, they can only be learned by association.

with a man whose hands are already skilled and whose judgment is already mature

The second is that our aim at all stages of medical education should rather be to train the student to deal with fresh problems than to store his mind with facts, that we should seek to develop in him an independent judgment that can appreciate beauty and truth by its own inner standards without demanding the seal of the expert, that can view the old that is accepted and the new that is cried in the market place with equal impartiality, that can trust its own decisions deliberately made, while making allowances for the opposing views of others, yet be ready to abandon the most cherished theory when fresh facts show it to be no longer tenable

What is this man, the surgeon, that we are educating? Is he born or made? Can we take any basic doctor and educate him to be a surgeon as the working bees take any grub and make it into a queen by putting it into a cell of the right size and feeding it on selected foods? Or must we find a man of a certain type and fit him for his life's work? These questions introduce still wider questions

What part does surgery play in the life of the community?

What type of man will play this part best?

How are we to find the right type of man?

How are we to make him a good surgeon?

How are we to keep him a good surgeon?

The first question is fundamental, for the selection and training of surgeons will depend on the part surgery plays in the life of the community. Is the work of the surgeon so difficult, and are its results so important, that we should choose him from among our more gifted doctors, and spend many years in educating him beyond the level required for qualification?

If we compare the conditions treated by surgeons with the average ailments of practice, we find they are on the whole more serious and yet more hopeful, and that the outcome is more dependent upon personal handling. Surgeons, apart from the treatment of cancer, which forms but a small part of their work, deal mainly with some temporary accident or disability in the life of a healthy person, and from the time of their intervention the patient starts a return journey to the level of functional efficiency

from which he departed, or, in the case of congenital lesions, to one he has as yet been unable to reach. The diagnosis, the action that follows it, the skill with which manipulations are performed, and personal supervision of the whole phase of recovery, are the factors that determine the final result. Thus from the points of view of individual happiness and national efficiency it is essential that the surgical services of a nation should be as good as perfect equipment and selected personnel can make them.

If, then, a nation requires that its surgeons should be first class, what can we call first class in this particular respect? A first-class surgeon must be a first class man, but a first-class man will not necessarily make a first-class surgeon. A preliminary selection is therefore advisable, so that our future surgeons may be drawn from a body of men representing the ablest stratum of their age group. This selection is made in the English Fellowship, and will shortly be made in the Scottish one, by a preliminary examination. In so far as this acts as a sieve, eliminating the plodders and reducing the entrants for the final examination to numbers that can be assessed thoroughly and fairly, it is good, but in so far as it is vocational in type, and demands not merely a minimum quantity but a certain quality of ability in future surgeons, it is bad. Surgery needs men of every kind—philosophers, dreamers, and poets as well as teachers, and men of action—and even the present much improved primary examination sets a premium on a retentive memory and takes little heed of originality.

It may well be that a common portal of entry opening to the password of ability of any kind, and giving access equally to all higher degrees and diplomas in medicine and surgery, would be an educational advance. Such an examination should be planned on the broadest possible lines. A first-class in any honours school, a contribution to music, painting, sculpture, or literature considered meritorious by experts in that art, original work in history, biology, chemistry, or mechanics—all these should be accepted not as substitutes for the examination but as justifying a more lenient standard in the other part of it. The man who has registered patents in Radar, who has won the Gauss prize for verse or had a sonata performed at Queen's Hall, will probably make a better surgeon than one whose chief claim to distinction

is that he can recite faultlessly the whole alphabet of the vitamins

Having sorted out our Herrenvolk, which of them are likely to make the best surgeons? In striving to answer this question, we must guard against the danger of setting up a graven image and worshipping it. A surgeon will be what he has it in him to be, and we do more harm than good by trying to mould him to an ideal of our own casting. Man asks many services of the dog. He asks him to befriend his children, guard his house, ward off his enemies, pursue the fugitive, to overtake the swift quarry, nose out the wily one, dig out the burrower. Through the centuries he has chosen his dogs for what they are, and the centuries have evolved types admirably suited to his various needs. But when to-day he sets out to produce a dog which shall not merely do something, but correspond to certain measurements and beauty standards, he degrades the canine race. It is only necessary to compare the undistinguished but lovable and intelligent fox terrier of the type immortalized by His Master's Voice with the flat headed, straight legged, brainless monstrosity of Crufts, to appreciate the dangers of planned creation.

In choosing a type that we consider the best, we may deny progress to a better. In setting a minimum standard we tend also to delimit the maximum. Surgery is a living subject, and with changing conditions and fresh discoveries the fibre of surgery must change and the men best suited to the new surgery may be different. We should always be ready to welcome into our ranks men who demand admission from some new portal, however despised or unorthodox the pathway may be along which they have come. Nevertheless we shall tend to select our recruits from among men of decision and of action, as indeed these men tend to select themselves. Decision is, in surgery, the counterpart of diagnosis in medicine, for surgical treatment must often precede the application of an exact label if it is to be effective.

There is a tendency at the present time to choose our future teachers and, indeed, our working surgeons, from among those who have made a name by research rather than by teaching or the care of the sick. The surgeon we wish to produce, and therefore the one who will best train the future generation, is he who gets his patients well. We are no more likely to find this man among laboratory workers than we are to recruit our best

pilots from among experts in aerodynamics or to win sea battles by choosing our admirals from the designers of battleships

Originality and research are often coupled, as if they were synonymous, they are not the same, rather are they in many ways opposite and incompatible. Originality, vision, imagination, are of the soul, research is of the mind. Originality runs ahead with her eyes on the clouds, she may trip up or she may find paradise. Research plods with her eyes on the road, to her the journey is more than its end. Originality is inspiration, research is constant inquiry. Research may produce original results, that is, it may unearth facts which have not hitherto been known, but it cannot discover originality in the man who undertakes it if it is not there to be developed. On the other hand originality may never lead to research, from lack of time or opportunity it may be killed by research, but it will provide the stimulus to research in others.

Research work is undertaken for a variety of reasons, it is done under orders by the laboratory executive, as a congenial livelihood by the studious, as a means of self expression by the inquiring, as a mental training by the ambitious and far sighted. This last motive is wholly admirable, and inspires work such as that now being undertaken by young men in Edinburgh, Manchester, at the Buckston Browne farm, and in many other centres. This work is all the more valuable because it is being conducted on problems which these men have already encountered, and because it is an incident in their training. There does not, however, appear to be any likelihood that the lot of these researchers will be cast permanently in the laboratory, they are the leaders of the next generation, men who will be the better able to inspire and direct their juniors because they have done this work themselves.

What surgery needs is the idea that starts research rather than the research itself. We honour Pasteur and Edison, but we must remember that the detail of Pasteur's work was done by a large team of laboratory assistants, and that Edison's inventions were translated into fact by mechanics. It should be possible in Britain, as it has been for many years in Germany and America, for the man with ideas to call upon a research workshop to carry out his experiments and answer his questions for him, just as the modern author gives his typist a box of dictaphone records to turn into

a novel, or as Charles Nicholson hands over the lines of *Endeavour* to a trained draughtsman for fairing and completion

The true research worker is more concerned with the road *than* the goal, knowing that where he stops others will take up the trail, to him each question leads to another question, seldom to an answer. The surgeon turns to research because in his work questions arise to which he must know the answer. If he is at the threshold of his career, he may leave the wards for a spell of months or years to follow the star that beckons, if he is already established, he will ask an expert to enlighten him or at least to tell him where to seek enlightenment. The relation of surgeon and research worker should be intimate, constant and lifelong, but never that of master and servant. The surgeon should bring his problems for solution, the scientist his hypotheses and his methods for test and trial. The best professor of surgery is seldom a man who presents himself to the Medical Research Council as a surgeon and to his surgical colleagues as a scientist, but he is very likely to get the job.

Having found our man, how are we to make him a good surgeon? What is a good surgeon? He must have knowledge of anatomy, physiology, pathology, surgical history, contemporary literature, and the work of other surgeons, wisdom, that is clinical sense and sound judgment based upon accumulated experience, originality, the power to build scattered observations into something new, ability to instruct by word of mouth and pen, and technical operative skill. The relative importance attached to these different qualities will vary with the assessor and the period, but I would suggest that mere technical skill be rated fairly low. The worst surgeons I met during the second world war were skilled operators. They had gone straight from the fellowship to a post where they had abundant and continuous operating without supervision or criticism, without the need to justify a diagnosis or explain a death. They were self taught men with an unlimited admiration for their teacher, and they knew all the answers but none of the questions.

It has been recommended that three years or more should elapse between graduation and the taking of a higher qualification, and that one of these years should be spent in junior resident appointments, one in senior resident appointments, and one in the study

of basic sciences—that is, anatomy, physiology, and pathology I view with some misgivings the suggestion that every intending surgeon should be compelled, for a third of this important phase of his career, to abandon clinical work for a spell in the atmosphere of pure science to which he may be entirely unsuited. A thorough knowledge of these three subjects is indispensable to him, but they should be integrated into all phases of his training rather than studied intensively for a short spell. By demonstratorships in each department in turn, by courses of lectures in applied anatomy, physiology, and pathology, by frequent staff conferences on clinical or museum subjects at which the teachers of the basic sciences take a prominent part, the scientific aspects of diagnosis and treatment and the clinical applications of science can be kept constantly before the developing surgeon and his more mature chief. The selection of three sciences as basic, set aside for a period of brief sequestered study, tends to discourage that free entry into collateral scientific channels which we should welcome in the progress of any developing clinician. Surgeons are individuals, and each can become good only by the emergence of the particular qualities in which he excels.

We must ensure at all costs that the best men, whenever and wherever they appear, get the best jobs. Among our stars of the future will be men recruited from many sciences. Frank Meleney owes the high position he holds to day to the fact that he brings to clinical problems the outlook and the methods learned in a long training in bacteriology. Champ Lyons has already shed much light on the treatment of wounds by the biological approach. Whether he intends to finish as a biological surgeon or a surgical biologist, he will derive benefit from his double training. Both Meleney and Lyons took up science, not as a temporary task in a planned course of training, not to earn merit with the scientific Olympians who sit with their eyes on the window of the incubator watching embryo surgeons develop, but with the inevitability and the enthusiasm that makes a man take up golf or fishing or fall for a particular girl.

Most will agree with the general recommendation that three years must elapse between the time when a man enters a surgical career and the time when he is allowed to sit for a higher examination. During this time we must train him for the requirements

we have already discussed—knowledge, wisdom, ability to instruct, craftsmanship, invention. These qualities we cannot teach except by giving abundant opportunities to learn. Teaching and learning are not complementary, rather are they incompatible. Teaching belongs to a school, learning to a university. A school consists of teachers and pupils, a university is an association of students of varying degrees of seniority for mutual benefit, in which teaching is reduced to a minimum. Men learn that is, absorb into the fibre of their being, what they find out for themselves, or think they do.

Knowledge is the result of study, of reading books and periodicals, attending meetings and lectures, visiting the wards, the post mortem room, and the laboratory. Wisdom is acquired, in so far as it can be acquired, by clinical study and discussion, by seeking out wise men, watching their methods, and listening to their comments. The teacher should never, figuratively at any rate, mount the platform. The six feet that separate the rostrum from the front bench are seldom spanned, but the barrier between experience and immaturity melts before personal contact. The relationship to be sought is not that between master and pupil but between master craftsman and apprentice. We should avoid systematic lectures and stereotyped instruction, and rather set our juniors problems and indicate a line along which they may be approached, standing ready to help, not when they meet difficulties, but later when, having made earnest attempts to surmount or circumvent them, they have reached a deadlock. Particularly valuable is teaching in the out patient department, for here the student can watch a more mature mind tackling problems that are equally new to both of them, without the help from any laboratory test, without even the certainty that the patient has anything more than a fancied ailment.

The ability to express himself before an audience and on paper is of the greatest importance to any surgeon, yet it is an accomplishment that is poorly taught, if at all, in Britain. As adviser to two of our journals I am distressed at the number of contributions I encounter that contain sound and original views, but are so ungrammatical and incoherent that they must be refused. An insistence by those shaping the medical curriculum and by school headmasters that general education must continue

during the period of the preliminary subjects should ensure that fewer illiterates train as surgeons in the future, but even a sound education will not enable a man to write, speak, and teach without constant practice. We must help these young men to get their ideas clear by putting them down in clear sentences. We must encourage them to show cases at clinical societies, to work up a subject and present it at a ward round or tutorial class, to speak at meetings, to write for the hospital journal, and to report unusual cases in the medical press. The staff conference, a commonplace in American hospitals, is long overdue in Britain. These gatherings, where the material for discussion is new to all but the opener, where juniors talk first and their seniors sum up, are unrivalled training grounds in self confidence and orderly statement.

Craftsmanship can be learned only in the operating theatre. The hours at present spent by students at operations are not merely a waste of time for them, they are waste of material and experience that would be invaluable to the surgical trainee. The practice of handing over simple operations to the house surgeon, and of leaving the remainder of a list to the registrar is equally wrong. Surgical technique, like surgical wisdom, can be taught only by apprenticeship. The senior should himself do the herniae and the haemorrhoids no less than the thyroids and cholecystectomies, and he should first be helped by his house surgeon and registrar, and later assist them at the same operations.

Originality cannot be taught. Some are born original, some achieve originality, but none have originality thrust upon them. Compulsory direction of all students to a period of research can do little good. Research can discover original facts, but it cannot discover originality in the men who undertake it unless it is there to be discovered. On the other hand originality, where dormant, is brought out by the spirit of inquiry that is fostered in the mutual study group. The prophet with his disciples, the professor with his yes men, the teacher with his class, live in a world of fixed tenets. The clinical teacher who remains a student through life and surrounds himself by preference with why men can set a spark to the latent fire in those who surround him more certainly than the man who directs them to specific lines of investigation.

If the three years between graduation and the taking of a higher qualification shape what a surgeon may become, it is the three

years immediately afterwards that mar or make him. The worst thing that can happen to a young surgeon is that he should go immediately after taking his fellowship to a post where he has abundant practical work, but no time to read or attend meetings, no time to think and write, and—still worse—no one to criticise or ask questions. The best thing is that he should become attached to a teaching unit.

A teaching centre should produce the best of surgical thought because it can foster in its ideal form the university spirit. The surgeon in such a centre, from the time of his appointment to the day of his retirement, is subjected to constant scrutiny and criticism, from his seniors, his contemporaries, and his juniors. If he is fortunate this criticism takes the form of frank inquiry, in answering which both he and the inquirers benefit. At present the men to whom these unique advantages are offered are chosen at an age when their future potentialities cannot be assessed with any accuracy. The grouping of hospitals, properly handled, should do much to abolish the inequalities of the present system, and to settle the problem of the later education of the surgeon. No man will be deprived of the benefits of constant contact and discussion, of teaching and being taught. No man need repine in a post to which he is unsuited and few should stay in any post permanently. As the students will benefit by being taken to outlying hospitals to see specialized work or to examine new cases under a fresh teacher, so will surgeons benefit by exchanges of posting, from town to country, from teaching to acute traumatic work.

The senior posts in the teaching hospital staff should not be subjected to change, but men need not be appointed to them till they are about forty five. If the weaned registrars, instead of being shaken off at the end of their appointments, are placed at one of the hospitals in the group, invited to all conferences and discussions, given their share in a rota of clinical lectures, and asked to assist in the teaching of such subjects as applied anatomy, if they are given a change of posting from time to time, and allowed fallow periods for travel and study, a body of men will grow up around the parent school from whom the selection of senior teachers can be made with a knowledge of what they are rather than what they may be, and each will develop into the best type of surgeon that his natural gifts will allow.

4 A SURGEON'S LIFE¹

(*Lancet*, 1948, II, p 1)

WHAT is the life of a surgeon? How does it differ from that of a physician? What characters distinguish the two great branches of medicine, and what circumstances prompt an individual to select one or the other? Where does the watershed lie that divides the diseases which are the province of the physician from those which are cared for by the surgeon?

Surgery has been defined as the art of treating injuries and diseases by manual operations. These operations are local manoeuvres applied to part of the body only, and they deal almost necessarily with localized trauma or with disease that is local or, if general, demands treatment because of some local manifestation. The main problems presented to the surgeon are the repair of injuries, the setting of fractures, the arrest of haemorrhage, the closure of wounds, the treatment of local sepsis by drainage, the removal of stones, areas of diseased tissues, innocent tumours, or malignant tumours while they are still confined to one part of the body, the overcoming of obstruction in a natural passage by excision or drainage, the correction of malformations and deformities, the redress of overaction in the endocrine or autonomic systems, the combating of local circulatory failure, the replacement of defects by grafting, and the relief of pain by the division of nerves or by the anatomical or functional elimination of its source. Thus surgery offers a considerable variety of tasks, but in this catalogue two common factors can be traced. First, the ailments enumerated are localized not merely in space, but in time. They involve part of a body the rest of which is healthy, and they come as temporary clouds in the sky of a life that has been clear and will be clear again. Secondly, the cure or relief depends largely or entirely on the action of the surgeon himself.

Surgery thus attracts the man whose interest in medicine is humanitarian rather than scientific, who loves his fellow men, who wishes to help them and to see that his help is effective. It appeals to the craftsman who likes using his hands, to the artist whose mind works on visual images, to the romantic who

¹ The Rutherford Monson Lecture, delivered at Newcastle on May 31st.

enjoys the drama of life particularly when it affords him the opportunity to play a decisive role, to the extrovert. The president of the residents, the footballer, the mountaineer, the yachtsman, are drawn instinctively towards the surgical side of practice. The prizewinner, the editor of the hospital journal, the debater, the naturalist, tend to find their vocation in medicine.

Entered on his chosen work, the surgeon finds those qualities that brought him into surgery further developed by its exercise. Because his patients, for the most part, suffer from local lesions of recent development that have not affected their general health or been accepted by them as part of their environment, he is consulted more urgently, more personally, than the physician. His help is needed as a friend and his advice as a counsellor, almost as much as his opinion is sought as an expert.

The guiding circumstance of a surgeon's life is personal responsibility. He is in charge, he must make decisions and initiate or carry out the line of action those decisions imply, and on the correctness of his decisions and the skill and determination with which the action is carried out depends the welfare and possibly the life of his patient. All the material for a correct diagnosis may not be available, at any rate at a particular time, but there must always be a decision, even though it may not be the right one it is the best that can be made at the time and the one on which action must be based if action is needed.

A surgeon conducting a difficult case is like the skipper of an ocean going racing yacht. He knows the port he must make, but he cannot foresee the course of the journey. He must be guided as he goes by changes of wind and weather, he must constantly seek help from the barometer, the lead, the look of the sky, the B B C weather forecast, and he must plan his course not so much as to give the most direct journey as at all stages to avoid possible dangers. At every point he must know how far he has travelled, where he is, and the limits of error within which his projected position may lie, what dangers and difficulties lie immediately ahead, and how soon he may expect to make port. At every stage he must have a plan, based on a working knowledge of his present position, that will allow him to make for the best of several available harbours should things go wrong,

or if none is suitable he must know where to find temporary refuge under the lee of the land till he can resume his journey

The physician's task is more comparable to that of the golfer. He may know the course and the hole he is playing from long familiarity, or he may for the first time be playing a difficult dog leg hole on a strange course. If he judges the direction and the wind right, estimates each lie correctly, finds the right club for each shot and uses it skilfully, he will get a bogie or a birdie. If he makes a mistake he will make a poor score, but will get there in the end. The ground will not split beneath his feet, the game will not change suddenly from golf to bull fighting. The ball may be lost, but that is a way balls have on rough courses.

In urgent surgery, particularly that of abdominal emergencies, the surgeon is constantly being called on for decisions based on his estimate of the probable course of events rather than on demonstrable facts and an unequivocal diagnosis. He must often ask himself which of several possible courses is the most dangerous if not the most likely, and therefore the one which must guide his actions. Before he decides to await fresh evidence he must consider whether the patient's state is likely to improve or to get worse in the interval. To the relations he must often say 'I do not yet know what is wrong, but it is something serious, and it is getting worse. Even in this uncertainty I advise operation, because I believe its risks to be less than those of continued waiting, and because I know it will tell us what is the matter and probably allow us to put it right.'

Even in matters of no urgency, where life and death are not at stake, a decision based on half knowledge and intuition is often needed. A lump of doubtful nature, but clearly innocent, may be found in a young woman's breast. Should it be watched, or should it be removed? The answer is more in the realm of human relations than of pathology or diagnosis. Will she accept reassurance and forget her lump till the next visit, or will she be *haunted by the fear of cancer night and day?*

A girl may complain of slight digestive disturbances, and on several occasions may be found to be tender over an area the size of a two-shilling piece at McBurney's point and nowhere else. Observation of the temperature, blood count, sedimentation rate, and barium meal show no abnormality. Should the

appendix be removed? Tell it not in the medical schools, but there is such a thing as chronic appendicitis. Tests will not show it, and the only proof is that at operation the appendix is found to be abnormal, and after it the patient is found to be well. The abnormality is not gross, but pathology differs from law in that it takes particular notice of small things. The chronically inflamed appendix when removed looks more opaque than the normal one, a dull white instead of a translucent pink, it is a little more rigid, and it can be bent but not tied in a half hitch, it is more vascular, and the vessels are not limited to its attached margin but form a continuous crest along its antimesenteric border. The patient, after its removal, undergoes no dramatic change, but merely says 'Now at last I am really well.' These 'chronic appendices,' as distinct from the relapsing ones, have never been acute. They harbour a resident pathogenic organism, often a streptococcus. Though they usually give rise to no more than vague ill health they may be responsible for the most dramatic train of symptoms.

The removal of a chronic appendix can do nothing but good, and the removal of a normal appendix in all honesty can do no harm. On the other hand, there is no operation more disastrous than facile appendicectomy where the disease is in the patient's mind or the surgeon's morals. Here again the choice is philosophic rather than scientific, a decision rather than a diagnosis.

The surgeon, then, has been drawn to his life's work because of certain qualities born in him or developed by his upbringing. Because he is a doer rather than a thinker, because he seeks practical tools and hopeful tasks, because he enjoys helping and being helped by his fellowmen, he finds satisfaction and happiness in the corporate loyalty of a surgical team and the cheerful banter of a surgical ward. As the years go by he becomes fixed in the same mould. He seeks sports such as sailing, hunting and mountaineering, in which companionship, manual skill, hard work, and a spice of danger are combined. He is seldom a profound reader, a good speaker, or a writer of distinction.

Life, however, is not quite so simple as it was described by the sentry in *Iolanthe*. Every boy and every gal that's born into this world alive is not necessarily a little liberal or else a little conservative, there are left wing conservatives and Tory

democrats, and between them the decisive mass of the untied electorate. The student is undoubtedly inclined by his natural qualities or early upbringing towards medicine or surgery, but his course thereafter is not immutably fixed like that of a drop of rain falling in the Black Forest, which may find its way down the Rhine to Rotterdam, or, if it falls a few yards to the north, will pass down the Danube and through the Black Sea and the Sea of Marmora to the Mediterranean. He will find at all stages of his career avenues leading from the main track, some taking him back to a highway which he had already rejected, others wandering through solitary and even unexplored country.

Specialization is a word that has almost lost its meaning. To-day all God's children are specialists—the man who cuts our hair, the man who mends our wireless, the man who cleans our chimneys. The term is used everywhere as a synonym for expert, but are specialization and ability really synonymous? Is a specialist in one branch of an art, trade or profession, necessarily superior to the man who practises the whole of it? If so, is he at the same time inferior to one who practises a subdivision of that branch, and he in turn to one who confines his labours to one small aspect of that subdivision?

Specialization arises in several ways. It may be called into being by the demands of the public, by the needs of the work, or by personal inclination. The public is always seeking what it believes to be the best, and having no standards of its own it will be guided by a label. Knowing nothing of degrees, appointments, published work, or established reputation, it flocks to the 'Harley Street specialist,' not realizing that a brass plate sometimes represents nothing but brass, and that the Harley Street district, besides being the home of the elect, harbours many rogues. Having diagnosed its own disease, it seeks the 'specialist' in that particular disease without being able to distinguish between the man who has made his own contribution to knowledge and the one who has set up his barrow where he suspects a good market. Public demand thus provides a reason but hardly a justification for specialism.

Specialism arises as an outcome of the needs of practice whenever new problems appear in medicine or surgery, or when old ones require further study because some fresh discovery has

In these, the surgeon's chief duty is to be an expert craftsman. He should know enough to understand what his medical colleague is talking about, enough to argue with him intelligently, enough even on rare occasions to disagree flatly with his conclusions, but, the decision having been reached, his rôle should be that of the technician, seeking to attain the objects which the physician has found to be most desirable by the means he knows to be most certain and most safe.

Such are the men who enter surgery, and such are the paths open to them when they have made their choice. What of the journey—their life? Some plod wearily along it, and some fall out, most march on gladly and hopefully, a few travel triumphantly ahead, smoothing the path as they go and giving fresh heart to those who follow them.

Who have been the great men of surgery? As we look into the past, great names crowd upon us, and we can speak only of a few of them. There are those whose lives are now matters of history—Thomas Vicary and Ambroise Paré, Hunter and Astley Cooper, Syme, Ferguson and Liston, Benjamin Brodie, Pott and Paget, Lister, Spencer Wells, Lawson Tait, Jonathan Hutchison, Hugh Owen Thomas, Von Mikulicz, Billroth, Trendelenburg, Dupuytren. There are others whose names are more recent in our memory, who have been seen and heard by many of us—MacEwen, Rutherford Morison, Trotter, Lane, the Mayos, Cushing, Halsted, Murphy, Kocher, von Eiselsberg, and Kirschner. And there are those still with us—Matas, Gallie, Evarts Graham, Frank Lahey, Danis, Gordon Taylor, Sampson Handley, Grey Turner, Henry Wade, Gillies, Jefferson, Zachary Cope, John Morley, and Harry Platt—all secure of their niche in Valhalla, and others, our contemporaries and juniors, whose names are now pinned on the notice board for consideration. What have these men in common?

In judging a surgeon we must consider qualities of the head, the heart, and the hand. We must consider his knowledge of the basic sciences on which surgery is founded, of the history of surgery, of contemporary literature on his own and related subjects, knowledge based not on reading alone but also on travel and on constant intercourse with his fellows. We must consider his that is, his capacity to blend the knowledge gained

shed new light on them or initiated a new line of treatment. It is necessary in the case of diseases, methods of investigation, or operations so rare that only by segregation is it possible for them to be studied in series or viewed as a whole. It arises where investigation or treatment involves the use of instruments or methods alien to those of general medicine or surgery, whose use requires special skill or long apprenticeship. It arises, too, for convenience in segregating patients of one sex, or one age-group, in the practice of a hospital.

Most surgeons, in however general a way they have started and however 'general' they may wish to remain, become to some extent specialists as they grow older, because they are attracted more and more to work of a special kind, because chance association or some feature of the district in which they work brings them many cases of a particular nature, or because they are recognized by their fellows as being unusually skilled in some form of treatment, and are asked to undertake it to an extent that practically excludes other work.

Such specialization, which is the natural outcome of a man's inclinations and ability, is inevitable, indeed highly desirable. All specialism, whether medical or surgical, has originated thus in the vision, energy, and enterprise of one man or a group of men, but it tends to be perpetuated by men of a different type. It is against the closed shop, designed to keep the privileges and emoluments of practice to those within the fold, removing its recruits at an early age from the competitive struggle of general medicine and surgery, and tending therefore to attract men in search of safety and an assured income rather than of adventure and discovery, that criticism must be levelled.

But specialisms are not all subdivisions either of medicine or of surgery. There are branches of practice, of which gynaecology, ophthalmology, and otolaryngology are the best examples, in which medicine and surgery are equally blended, and in which physiology becomes more important than anatomy. In surgery one system specialisms are developing apace. The neurosurgeon is now a neurologist, the thoracic surgeon is an expert at physical signs and the interpretation of radiograms, a student of the physiology of the circulatory and respiratory systems, and a physician skilled at their disorders. The gastric and proctological

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from reading and from his own experience into a clinical common sense which he is able to apply to his daily problems as they arise, his readiness to look on surgery as a whole, and to see it in relation to the great body of science. We must consider his originality, his power to see a common factor linking scattered observations and to follow the path those observations blaze to fresh knowledge, to see the fallacies in old methods and to plan new ones, his ability to avoid complacency and to preserve throughout life an attitude of alert and adventurous expectancy. We must include in qualities of the mind his power to instruct by word of mouth or pen, to see through the trappings of a matter its essential core, to write clearly and speak convincingly.

Of qualities of the heart that a surgeon must possess the first is humility. The great surgeon is humble by nature, because the things he has done count for him as very little in comparison with the great mass of the things that yet remain to be done. He is slow to criticise others, yet tolerant of those who criticise him. He has an instinctive love of his fellow men, a sympathy that considers each case as a personal problem requiring individual treatment, a human understanding that can interpret the patient's halting story in terms of the sorrows, hopes, and fears that the words conceal. Because of his humility and human kindness he is approachable to his juniors. He must have courage to undertake the desperate risk and, having failed, to study why he failed and undertake it again. He must be prepared to face unpopularity and even failure in the pursuit of what he believes to be right, to meet censure and ignore it if he knows it to be unfounded.

Lastly we must consider his manual skill, for in the use of his hands his other qualities find their final expression, but we cannot assess mere technique particularly high. Even in plastic surgery, where meticulous artistry might be thought to be the first consideration, the best results are obtained by those who think, plan, and prepare, rather than by those who perform with the self-conscious skill of the trapeze artist. Many of the greatest surgeons were but indifferent operators, and conversely many, perhaps most, brilliant technicians have been second-rate surgeons, earning the meretricious applause of the virtuoso while their

artistry was at its heyday—forgotten like the discarded *prima donna* as soon as their skill passed its zenith

A bad surgeon is one who has inherited the trends but not the traditions of a great master, who has his mannerisms without his manners. He looks at disease through an endoscope. He speaks of cases not patients. He has no culture, no knowledge of the basic sciences, and therefore no breadth of vision. He knows all about operating except when to refrain.

Probably no surgeon, however great, has possessed all the desirable qualities in their perfection, but those who have become great have possessed many of them in high degree. Greatness of the hand is greatness of the hour, lasting only while the skill lasts and forgotten within a few months of death or retirement. Greatness of the head leads to a secure place during life and an honoured memory afterwards. Greatness of the heart brings a *personal influence on patients and pupils and a name that will live among them for one or more generations*. When greatness of head and heart are found together they bring immortality, for, though contributions to science and literature become superseded by fresh knowledge, or are merely consulted by the curious as eponyms, such contributions linked to the memory of a human personality and a loved teacher live for all time.

If the ability to found a school in the place where he has worked, and to leave a living memory rather than a bibliography, is the test of greatness, then personality is the most important attribute of the great surgeon. Lawson Tait had an original mind and great operative skill, but he was a boor. MacEwen was, perhaps, the greatest surgical genius of the past hundred years, he had courage in the highest degree, but he lacked generosity and humility, he was admired but not loved, and he left few friends and no disciples. Robert Jones, on the other hand, was loved as few surgeons have been loved, and he trained a host of disciples, but he was not outstanding either as an operator or a thinker and, when the present generation of his pupils has passed away, he will be remembered chiefly as the nephew and disciple of Hugh Owen Thomas. John Hunter and, more recently, Rutherford Morison stand out as examples of men who left contributions of lasting importance, the memory of colourful personalities, and

successors who carried their names and methods to other years and other lands.

Of Hunter much has been written. His mind wrestled with the whole range of anatomy, physiology, and pathology, often failing because the problems he attacked could not be solved with the methods and instruments of his day, but pointing the solution to those who followed. The fire of his genius threw a beam into the darkness ahead and lit the torch of inquiry that has been the glory of British surgery. His example inspired his contemporaries, and his pupils carried his gospel to all countries.

Rutherford Morison is honoured everywhere in the world. He was great by any definition, because he excelled alike in those qualities of the head, the hand, and particularly of the heart that make for greatness in surgery. He was, perhaps, fortunate in that, being endowed with a great brain, he was not subjected to any system of education such as we are planning to-day for the surgeons of the future, designed to mould them to our own conception of the ideal surgeon. He educated himself, and he spent his early years in general practice, where he gained that intimate insight into human nature that was one of his most endearing characteristics. Having entered surgery, he became and remained through life a student of pathology. Of his manual skill many can speak with greater authority than I, but as an operator he was ahead of his time. He will, perhaps, be remembered best by his operation for ascites and by the right kidney pouch which bears his name, but he was also a pioneer in operations for cancer of the breast, in the dissection of cervical glands, and in gastrectomy. He remained through life a great practical surgeon, careful in undertaking, thorough in performance. Rutherford Morison excelled in qualities of the heart. His teaching was human, vivid, and personal, based on his knowledge and love of the Tynesiders who were his patients and his students. He taught in general principles, which the problem in hand was used to illustrate. And because he was a great man as well as a great surgeon, he handed on the spirit as well as the letter of his creed, and became the greatest disseminator of surgical thought and the greatest maker of surgeons within living memory. Rutherford Morison lives to-day in two of his greatest pupils, George Grey Turner and Charles Saint, and through them in the

surgical departments of the postgraduate Medical School of London and of the University of Cape Town

These great surgeons were men of our race. Let us not forget that all the decisive advances in surgery, the application of the scientific method, the development if not the invention of anaesthesia, the demonstration of the cause and prevention of sepsis, the establishment of the technique of asepsis, and finally the discovery and isolation of penicillin, originated in this country, and that British surgery has at all times been and still remains in the front rank.

How can we ensure that this happy state of affairs shall continue? How shall we breed the great surgeons of the future? There are at least four stages in the forming of a surgeon: he must be found, he must be qualified, he must be trained, and he must be given opportunities.

If surgery is the high calling we believe it to be, if it deals with problems of the utmost importance in the life of the individual and in the economy of the nation, it must be kept in the hands of worthy men, and worthy men alone. The equality of man is a political belief but not a biological fact, and if we wish our future surgeons to be first-class men we must begin by selecting first-class students to enter surgery.

A higher postgraduate examination is also necessary, for it is essential that the recruit to any art or science shall, at the outset of his career, be familiar with the whole body of orthodox knowledge which has been built up by those before him, and must form the platform from which he will start on his own career. He may, in future, diverge in any way he likes, but he should not, through ignorance, make mistakes that have already been made and corrected, or strive laboriously towards knowledge which is already available for the asking.

The final examination must be searching, but it must be kind. It should seek to find out not what the candidate has been taught but what he has learnt for himself, not what he thinks but how he thinks. It should be kindly enough to put him at ease, and leisurely enough to allow the examiner to get past his nervousness and see through his bluff. The more carefully the examiners are chosen for their human qualities rather than for their academic

status, and the more the numbers of the candidates are reduced by preliminary sorting, the fairer will such an examination be.

The training of a surgeon, at any rate of one who is to be more than a journeyman operator, begins after he has taken a higher surgical degree. Knowledge must be increased, wisdom must be acquired, originality must be developed, the ability to speak and write must be learnt by constant practice, and operative experience and technical skill must be gained by apprenticeship. These things cannot be found in books. They cannot be self-taught by the isolated surgeon undertaking responsibility without supervision. They can be learnt only by the methods by which every art is learnt, the personal contact of disciple and teacher. The most important thing, therefore, in the training of a surgeon is the selection of the man who shall train him. Here, again, personality is more than ability, the heart is more than the head or the hand. The teacher may not have contributed many advances to his subject, but originality is a gift that must be discovered and cannot be transmitted, he may be an indifferent operator, but manual skill can be picked up for the watching in any surgical workshop. But if he is able to transmit to his pupils the fire that is in him, so that they think, live and dream surgery, and turn in their waking hours to the surgical thoughts on which they have gone to sleep, he will breed a group of young surgeons who will develop the best of which they are capable. And that, after all, must be the aim of training—not to produce men of a certain stamp, but to attract the best men to surgery, hand on to them the best we ourselves know, help them to develop the talents that each possesses, and remain prepared to recognize and encourage the best, whatever form it may take and from whatever source it may come. We cannot find the real genius, he will find himself. We cannot do more than start his training, for in the end he will train us.

By planned evolution man has, in the world of plants and animals, produced some striking new forms, but ones that have also lost the strength and resilience of their natural stock. By planned education we may lose some essential qualification in striving to develop another. Before the war of 1914-18 the cadet surgeon was given a training that developed his knowledge and teaching ability to the full but did little to train his originality,

power of decision, or manual skill. He spent his days teaching in the wards or the dissecting rooms. He was seldom allowed to operate, and even when he was appointed assistant surgeon he had no beds in his own right. The surgeons trained under this system were fine clinicians and gifted teachers, the writers of excellent textbooks, but they contributed few advances of importance, and they were, on the whole, indifferent operators. The juniors between the two world wars were encouraged to operate at an age and to an extent that were possibly harmful. They did not get enough apprenticeship in bedside discussions or in the basic manoeuvres of surgical handicraft. They did not get enough time to think, to read, to watch others at work, to keep themselves in touch with the world outside surgery. They tended to become slick technicians, virtuosos rather than maestros, to be interested in the drama and intricacy of an operation rather than in its purpose, the welfare of an individual patient.

I believe that in the organization of the surgical services in the recent war we came very near to steering the ideal course between regulated orthodoxy on the one hand and unrestrained empiricism on the other. To those surgeons fortunate to be assigned an active role in it, the war was the perfect university. They mingled at work and at play with others from every medical school in the English speaking world. They discussed their problems with men who had faced the same difficulties under different conditions of climate, housing, and supplies. They could seek help from surgeons of greater experience, and in turn could sort out their own ideas by helping the newcomer. They were watched, helped, encouraged, guided, restrained, and, if necessary, rested or replaced by consulting surgeons who were watching the whole progress of war surgery over a wider horizon than they could possibly cover. They kept records of their cases, and received reports of the same cases later from other hospitals. They worked in the stress of a forward operating centre during battle, and equally hard in the more regulated surgery of a base hospital. They collaborated and argued with experts in every branch of medicine and medical research. They attended conferences. They were inactive for weeks at a time, and if they had used their previous experience well they often learned

most in these fallow periods, for it is a peculiarity of the human mind that it is often most fertile in idle periods between spells of hard work. It may thus happen that, while he is watching a chameleon stalking flies in the western desert, or leaning over the rail in some Pacific harbour while the remains of a fleet's breakfast swirls along the ship's side, a surgeon will capture the idea that has eluded him during weeks of intensive study.

One of the greatest needs of surgery as a whole, as it is for the individual surgeon, is the integration of accumulated knowledge. Intellectual progress, like bodily growth, demands ingestion, digestion, absorption, synthesis, and the elimination of waste products. Many men are spending a forty hour week on a moderate but secure salary accumulating facts. Many men are describing new signs or symptoms, syndromes or diseases, new instruments or new operations. Very few are attempting to correlate these facts, to sift the corn from the chaff, to take a broad view of the present state of surgery in its relation to medicine as a whole or even to the great body of science, largely because few have the leisure to do so.

Research scholarships and fellowships are now so plentiful that, in many cases, they are no longer a spur to the ambitious and a help to the deserving, but a refuge for the timid and a pension for the plodder. Practical benevolence may, in the future, be more profitably directed to endowing, with the liberality that the position they have secured for themselves warrants and the commitments they have already undertaken requires, travelling fellowships for successful clinicians between the ages of forty and fifty, so that they may step aside for a year or two from the labour of clinical work and the struggle for economic security and see for a while, as onlookers, the battle in which they have been engaged, so that they may travel and assess the work of their contemporaries in other lands with calmer impartiality and more balanced judgment than the immediate postgraduate can ever do, so that under the stimulus of these fresh contacts they may review *the experience of the past ten or fifteen years and attempt to work out the half formed ideas that have been struggling to find expression*.

5 THE GENTLE SURGEON

(*Lancet*, 1936, I, pp 435-36)

'It would be well, I think, if the surgeon would fix upon his memory as the first professional thought which should accompany him in the course of his daily occupation this physiological truth—that Nature has a constant tendency to repair the injuries to which her structures may have been subjected, whether those injuries be the result of fatigue or exhaustion, of inflammation or accident'

JOHN HILTON, *Rest and Pain*

MR C H FAGGE, in his Hunterian Oration, has painted a scholarly picture of one of the great figures of Victorian surgery John Hilton was a truly great man, but, lacking perhaps the spectacular personality of many of his contemporaries, he has never received that recognition which his merits demand or his influence on surgical thought and practice would justify His name is known to every student in Hilton's method of opening an abscess his lectures on *Rest and Pain* are familiar in name to the majority, and in substance to the more industrious But his contribution is more than a technical device and a series of clinical observations, many of which have been disproved by later knowledge The quotation prefacing this chapter gives a clue to the spirit that animates all Hilton's writings, a spirit that shows him to have been a scientific and thoughtful surgeon, perhaps the first of a type, which it is to be hoped, characterizes the best of surgery to day To say that he was the first implies *no disparagement of John Hunter* Hunter was an intellectual giant, he moved and thought on a higher plane than other men, and the standards by which we judge them seem to fit him not at all But his great and restless spirit was engaged upon the problems of disease in general, while Hilton's gentle and practical mind studied the more intimate problems of Nature's own surgery as exemplified in the patients who came under his care Hilton was no mean anatomist, as his numerous dissections, immortalized in wax by the art of Joseph Towne, bear witness to day But he was very much more His interest in the body

was not confined to the study of its dead framework, and to the discussion of theories as to how structures ought to work which had ceased to do so, he watched these same structures in life, striving to learn for himself how they carried out their duties in health, and how they attempted to repair their injuries. He was the first physiological surgeon, set apart from his fellows by his faith rather than his works. They study attack, he defence, they consider what can be done to an organ, the limits of its endurance, the best approach to it, the instruments and methods of anaesthesia suited to the enterprise they contemplate, he considers how it works in health, how its working has been modified or vitiated by disease or injury, how it is attempting to repair or circumvent the damage it has suffered, how best he himself can aid these efforts, or how imitate the normal function if repair is impossible. His handling is characterized by a regard for the tissues as purposeful, almost sentient, agents of repair. Above all things he is gentle.

Gentle handling is recognized to day as the aim of every surgeon. That this spirit should be abroad is the greatest monument to Hilton's influence, for it has not always been so. Surgical history, indeed, contains the names of others who thought as Hilton, of men who have spoken as did Ambrose Pare: 'I dressed his wound, God healed him.' But most of the older surgeons were men of action rather than of thought, as they had to be before anaesthesia or antiseptics were known. The tales that come down to us are of uncouth choleric men, of retorts whose discourtesy has made them classic, of bold and skilful but brutal manipulations, of blood and agony, of boastful self-assertion, of fierce quarrels, of chicanery and nepotism. It might have been expected that gentleness would come when anaesthesia had abolished the need for speed, but the same agent made more extensive operations possible, so that the need for speed remained. With the coming of asepsis, a whole new field of operative work, as yet unexplored, was thrown open. Bold and untried adventures, such as the early explorations of the abdomen, could only be carried through successfully, at a time when anaesthesia was still understood imperfectly and shock not at all, by surgeons who worked at lightning speed. We therefore find that during the first few years of this century the ultra rapid operator was

undisputed king of surgery, or, at any rate, of surgical practice. Slashing his way through tissues in a manner that would horrify the student of to day, he was able to show that the operations which have since been perfected were possible. His patients survived, his ventral herniae were closed by others, and his methods have since been changed beyond recognition.

It is, perhaps, unduly optimistic to say that rough surgery is extinct to day. Human nature, and especially adolescent human nature as exemplified by the medical student, will always prefer the spectacular to the artistic, and the gentle surgeon is often a gentle man. He may find, to his chagrin, that the best students flock where the blood flows most freely, where the shouts are the loudest, where instruments are thrown about the theatre, where 'look and see', the infallible solvent of diagnostic difficulties, ensures an abundant succession of *tours de force*. Yet he has his reward when the same men, older and wiser, come to him as house surgeons and registrars to learn those details of tissue kindness which are unseen from the gallery. For this Hiltonian surgery is taught and propagated by apprenticeship. Men speak of Halsted technique, Lane technique, Moynihan technique, each meaning the same thing, the standard of work of a great master at whose side he has studied, a standard whose only criterion is that the tissues shall be treated with the greatest gentleness, subjected to the least damage, replaced carefully, apposed accurately—in short, that they shall bear the least trace of the surgeon's passage. Such methods gain adherence by their results rather than their performance. Their victory is symbolized by the disappearance of the old operating 'theatre,' suited for the dramatic in surgery, and its replacement by what is almost an operating temple, where the faithful can study essential detail. Their performance is made possible by better anaesthesia and more highly skilled assistance, which have eliminated the need for hurried work, so that only its quality need be considered. Their perpetuity is assured by a new school of young men, trained in the use of their hands at a time when they can acquire the touch of an artist.

The change, like all important changes, has been gradual, but on a ten year period it is obvious enough. During the last decade operating by the clock has become a bad joke, traumatic muscle cutting and nerve damaging incisions in the abdominal wall

have disappeared, haemostasis has become universal, strong antiseptics, purgation, and starvation, have been abolished from the surgical ward. If we make the interval of survey twenty instead of ten years we must admit that the surgical registrar of to day is often a better operator than the leading surgeon of 1915. There is still room for improvement, particularly in the technique of those operations which are not considered to be major surgery. Haemorrhoids are still torn rather than dissected out, the average operation for hernia is still coarse, traumatic, and unphysiological; and even the gentle surgeon is often content to apply his principles to the deeper layers only, forgetting the physiology of the skin and subcutaneous tissues. Yet the day is clearly not far distant when all operations will be done with the unhurried exactness of the surgeon neurologist, when all scars will be the invisible line of the plastic surgeon. For the beautiful scar is more than a work of art. Wherever placed it is proof of healing, not merely without sepsis but without any recognizable reaction to repair, it is a guarantee of lasting comfort for the patient and of untainted soil for the man who may have to come afterwards. It is the signature of the gentle surgeon.

6 BRITISH AND CONTINENTAL SURGEONS¹

AUTOBIOGRAPHIES that survive a first edition are nearly always anecdotal rather than analytical, for the author who believes that an assessment of his own character is of outstanding interest to his fellows is usually a bore. Such 'lives' of great men all remind us we should make our lives sublime—but allow others to say how far we have succeeded.

An estimate of the character of a nation by one of its citizens has many of the weaknesses of an autobiography, but the task is worth attempting, for the opinions of foreigners are rarely well enough informed or sufficiently detached, and in any case they differ among themselves to such an extent that no representative picture can be drawn from them. Americans regard the Britisher as a fool, Germans as a villain, Frenchmen as an opportunist; if well disposed, they may add that he is an amiable fool, an honest villain, a successful opportunist. We picture ourselves as John Bull, the plain blunt man who calls a spade a spade, who 'does not know anything about art, but knows what he likes.' We pride ourselves that our particular contribution to education, the public school, is concerned with the development of character rather than culture, the production of men of action rather than men of ideas.

Thought and decision are thus contrasted, as if they were incompatible. The implied corollary, that where the two are found apart, decision is the more essential to success, is probably true. When the curtain falls on the last act, Hamlet, the irresolute philosopher, is dead and discredited, and Fortinbras, the brainless man of action, holds the stage alone. But both qualities are necessary, and as the world passes from being a jungle which must be hewn and remade, to the condition of an estate which must be planned and cultivated, the less important become quick instinctive decisions and forceful acts, the more important the weighing of alternatives and the planning of considered policies, the examining of the distant no less than the immediate consequences of action. Under such conditions the last refinement of education, the ability of the mind not merely to marshal and

¹ *Lancet*, 1936, II, p. 459 (anonymous)

use effectively its own knowledge, but to know its own ignorance, is its most valuable gift

It is a fundamental weakness of the character of John Bull that he is often unable to appreciate the necessary limits of education in a single person, to see that the more intricate any branch of knowledge has become, the less can even its language be understood without prolonged and painstaking apprenticeship, lacking which, sense and claptrap become indistinguishable. He is unwilling to admit, or perhaps unable to understand, that his native 'common sense' is not more than a match for some one else's store of wisdom acquired by patient labour. He may confess his inability to play the violin, where the difference between skill and incompetence is obvious to others as well as himself, but he is ready to design his house, prepare legal documents, advise the B B C., write to the papers explaining the origin of some obscure word or custom, or decide the foreign policy of a distant State.

A second characteristic, for which this self-sufficiency is indirectly responsible, is his belief that, in matters beyond his comprehension, anything which is foreign, bizarre, and mystical, must necessarily be better than the native, the familiar, or the reasoned. 'If I cannot understand this,' he argues, 'is it likely that some so-called expert who has had the same education as myself, and has lived by me, can be any better?' The welcome that Britain extends to foreign artists, and to foreign ones alone, is so proverbial that until recently few of our own aspirants could afford to face the public in their own names. The talented Londoners who form the backbone of the Russian Ballet would find it difficult to get any employment under their brief patronyms. Foreign doctors are received with equal enthusiasm and no more scrutiny.

These failings of complacency and credulity are not, unfortunately, confined to the ill-educated, but are, perhaps, most obvious among the intelligentsia and the aristocracy. It is to members of the peerage, successful business and professional men, and those who live within a stroll of Hyde Park Corner, that the charlatan, the quack, and the exotic virtuoso can always appeal for adulation and financial support. These classes, secure

in an inherited or acquired position, are prone to assume that they are by this excellence made freemen of all science and all art.

Such people, not unnaturally, take surgery in their stride. They diagnose their complaints, decide the necessary treatment, and pick the expert who is to undertake it. They get what they want, and thus find the goal that most men strive for and seldom reach, therefore they are happy. But where a correct surgical decision affects matters of public policy, this omniscience may lead to grave harm. It is disquieting to see how often verdicts of importance in the law courts have been swayed by medical evidence given clearly and convincingly, but based upon assumptions far too massive for the slender foundations upon which they rest, and quite out of proportion to the professional standing of the witness. Thus a man was recently awarded a large sum in compensation after an accident because such a witness, well meaning but ignorant of radiology, had pointed out the cornu of the hyoid in a radiogram as a fracture of a transverse process of one of the cervical vertebrae. The lawyer, paid to sift evidence, is unaware that specialized evidence cannot even be considered adequately by one unfamiliar with the syntax of the language in which it is spoken. He appears to judge the credibility of a man by his behaviour under somewhat trying circumstances rather than by his acknowledged experience or professional standing. Medical assessors are appointed, but their advice is seldom asked and more seldom followed.

Any disadvantage that may accrue to surgery itself from the prevalence of this spirit are, however, local and comparatively unimportant. British surgery offers, it is true, two kinds of success, the social and the professional, and seldom awards both to the same man, but it has for the same reason remained free from the domination of a fixed hierarchy of experts, recognized by State and society, that brings in its train the evils of an established religion or an academy of arts—traditionalism and complacency. In place of the secure and unassailable seat of authority, which is the reward of the accepted surgeon on the continent of Europe, it holds as its highest honour the recognition of colleagues, men working at like problems for the advancement of the same subject.

It is characteristic of continental surgery that professional and

national recognition are synonymous. The great surgeon is, at the same time, an honoured servant of the State and a familiar figure to the people. There is no counterpart to two types that are met in England, on the one hand the idol of the public, whose name is a household word and whose portrait is news, but whose knowledge is superficial and his reputation among his fellows small, on the other the unrecognized pioneer, whose writings are eagerly read and whose wards and operating theatre are thronged with visitors, but whose consulting room is empty and whose name is unknown to the man in the street.

Continental surgery has its home in large professorial units. There the chief has under his care something like 300 beds, and directs a large staff of assistants of varying degrees of seniority. His word is law in the town where his clinic is situated. His opinion on surgical matters is never questioned. His assistants work entirely under his direction and to his approval. All operations, upon hospital or private patients, are his by right. All publications emanating from the clinic bear his name in addition to that of the author.

The advantages of such a system are manifest. If the professor is a great man, and such is the competition for the few glittering prizes that only those of outstanding ability secure them, he impresses the stamp of his personality on the whole work of his clinic, and gives it a unity of outlook that is unattainable under conditions of scattered effort. He has more clinical material than he can cope with personally, but he maintains control even of the work that he delegates, while he is able with such numbers to collect many examples of any disorder in which he is interested or on which he holds particular views, and to test any suggested plan of operation on a scale that will give it adequate trial. He can undertake investigations on a systematic scale, allotting to his assistants tasks suited to their particular abilities, each task bearing some relation to the other. He can answer questions before the zeal of their first encounter has died out. He can command any apparatus that he needs for treatment or research without any thought of the expense entailed. He acquires phenomenal skill with his hands, and, operating year after year with the same team, is able to bring the most hazardous undertakings to a successful conclusion.

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On the other hand the system leads in each centre to a permanence of local tradition, and in the country as a whole to national insularity. Access to the highest posts is only through long and obedient apprenticeship, continued to an age when initiative is usually dulled. The picked student enters a surgical service after qualification as the vassal of his chief. He finds work under such a master a happy privilege, but he remains aware that a higher post in the same or another clinic is obtainable only through personal recommendation, and that open heterodoxy spells the doom of his career. Arrived at the more senior appointments, he works for many years as personal helper of the professor, and only at the age of about fifty, and then only if he is able to secure one of the very few posts that fall vacant, does he become his own master, able for the first time to speak without fear of contradiction and to act without fear of censure. Men thus trained carry on in its broad outlines the teaching of their late chief, who in turn was following that of his predecessors. The views and many of the technical devices of von Mikulicz and von Eiselsberg are thus perpetuated to-day to the third and fourth generation in a way that has no counterpart in this country.

The domination of the large clinic tends also to the development of a national rather than an international outlook on surgery. The continental surgeon rarely travels outside his own country or national group, and while he studies assiduously within these limits, his knowledge sometimes has surprising hiatuses. Operations for cancer of the breast and for removal of damaged cartilages in the knee are performed in some of the best centres in a manner that surprises the British or American surgeon, used to the standards of his own country. The size of the service has the further consequence that patients come to be regarded as units in a series rather than as individuals, that the operations performed are those favoured for that disease by that surgeon at that moment, rather than modified procedures chosen to suit the specific lesion of one particular man. There is a certain failure in sympathy and human contact which expresses itself in a poor general level of nursing and of anaesthesia. Professional anaesthetists in the sense that the term is understood in America and the British Commonwealth are rare, and local anaesthesia is often used because there is no satisfactory alternative, and then

rather to allay the surgeon's conscience than the patient's pain.

National surgery is modified by national temperament. If a notice 'Keep off the grass' is put up in a public park, the German will walk round it though this adds a mile to his course, and, should there be no grass, he will find a keeper to point out the inaccuracy, the Frenchman will walk on the grass though it be muddy and the path dry, and will dig in his heels to show authority that it may not with impunity command the free-born, the Englishman will add 'please' to the notice, but will obey it unless this involves a long detour. German surgeons bring to their opportunities a thoroughness and industry that are wholly admirable, and ensure that no slipshod or premature announcement mars their publications. Whether this will hold good now that scientific no less than civic appointments are given for political soundness and racial purity rather than merit is uncertain.¹ Willy Meyer and Israel will be hard to replace. French surgeons lose by a certain intolerance and contempt for the knowledge and culture of other nations, whose advances they rarely study or assimilate. Calmette's book on tuberculosis is as remarkable for its lack of reference to any but French work as for its painstaking thoroughness.

Such generalizations apply in the broadest sense only, and err, like most generalizations, on the side of detraction. Any travelled surgeon will remember, in contrast, the happy camaraderie and excellent anaesthesia of the Swedish and Dutch hospitals, the unselfish devotion of nursing Sisterhoods in many countries, the wide knowledge and fertile invention of Lénche, the kindly humanity of Finsterer, the great intellect and supreme artistry of Kirschner.

The British surgeon is also moulded by national character, his own and that of his fellows. He sees in front of him no professional ladder, whose well worn rungs he must climb, as others have done before him, to an assured position at the top. If he seeks public recognition, he knows that he is more likely to obtain it by a beautiful motor-car or a socially-minded wife, than by originality or skill. If, on the other hand, he seeks the good opinion of his fellows, he knows that he is more likely to earn it

¹ This was written in 1936. The lamentable level of German surgery in the late war provided the answer.

by sound work and original views than by subservience to tradition. He shares with his lay friends a belief in the superiority of the foreigner, and he uses every opportunity to visit continental clinics and to study foreign literature—this last, it must be admitted, in the abstract, for he is no linguist. He cannot exist without a club, and this leads him to travel in company, so securing the treble advantage of a Cook's party ticket for the journey, a carefully prepared reception when he arrives, and collective rumination of each intellectual meal. However, to suggest that this catholicity is the inevitable outcome of national character is to do less than justice to Lord Moynihan, whose work and example are largely responsible for the unity and wide outlook of British surgery. The Association of Surgeons, the *British Journal of Surgery*, and the many travelling clubs which have followed his own, will remain a monument to his memory should his contributions to surgical art and science ever pass into oblivion. These informal clubs, small enough to allow all the members to know each other intimately, to travel and lodge in company, and to fit into a demonstration or operating theatre without overcrowding, are an institution peculiar to Britain. Surgeons from the Dominions and America are equally enthusiastic travellers, but they come singly or in battalions. Thus, wherever in the world good surgery is to be seen, there will British surgeons be found, seeking knowledge. Thus the teaching of Bohler, for example, found earlier acceptance in Britain than in Austria, Germany or France.

The character of British surgery is further influenced by the wide opportunity it offers to men of every stamp. On the continent it is clear that one who would reach the highest ranks must be academically distinguished, orthodox in his tenets, tactful, and patient. In Britain, on the other hand, any man can rise to the top on his merits, though his qualifications are of the humblest, his views eccentric, his origin obscure, and his manners uncouth. One of our leading surgeons, a man from whom I have learned more than I can acknowledge, has won an international reputation in his own branch of surgery and a teaching appointment in an important university with a pass degree in surgery. Some have made a name by fighting the tenets of their own school, and now have no surer friends or warmer supporters than their

old teachers. Others again, who miss no opportunity to offend a patient or quarrel with a colleague, have risen to high positions by the excellence of their work alone.

This wide opportunity is again the outcome of two national traits, the unparalleled generosity of the public, and its refusal to accept any experts other than those of its own choosing. No appeal for funds is ever launched in vain. Famine, flood, pestilence, or war in the most distant lands will always move the Britisher to put his hands into his pocket to relieve the victims. When the appeal is for a hospital the response is usually immediate, and the largest sum raised in the shortest time for this purpose was subscribed by the inhabitants of that Scottish city whose grim pride is in its reputation for close-fistedness. The characteristic British hospital, therefore, is not the large *Allgemeines Krankenhaus* or *Universitäts Klinik*, but the much smaller voluntary hospital. Every town has its hospital, and nearly every village its cottage hospital. They vary in size from a thousand beds to a dozen, and in scope from general work to limited specialism.

The surgical beds in any district are not only split up between a number of hospitals, but in each hospital they are divided into units under the care of individuals, each surgeon assuming responsibility only for the number of patients he can care for personally. Whereas on the continent 300 surgical beds would be under the charge of a professor, working with a large number of assistants under his orders, in England the same number is shared between from five to ten different surgeons, each of them entirely responsible, and responsible for his own cases alone. There are, it is true, full and assistant surgeons, but their association is not that of master and apprentice, but of senior and junior colleague working in a loose and voluntary partnership, and differing in age and allocation of duties rather than in authority. These surgeons are appointed on the advice of their colleagues in assembly, not by State or University boards guided by the confidential report of their late chief.

These various hospitals offer opportunities of surgical practice, not merely to a large number of men, but to men approaching surgery from many different paths and at different ages. The small hospital in a university town gives to the registrar the

advantage of a certain number of beds under his absolute control where he can perfect his methods and work out his ideas while he is teaching, researching, and waiting for an appointment at his own school. It gives the surgeon who has no ambition to become a teacher the opportunity of lifelong association. The country town or country hospitals may appoint their surgeons by several methods. They may find a man on the spot whose ability has made him the obvious choice, a practitioner with previous surgical training who has come to the district with a view to such a vacancy, a surgeon from one of the government services retired to civil life, a house surgeon or resident surgical officer whose work in a salaried post has justified his promotion to an honorary one. Or they may advertise the vacancy and award it to a young registrar from a teaching hospital, or a more senior surgeon at a smaller one, who is anxious for wider opportunities.

All these surgeons throughout the country are free from any control other than that provided by the opinion of their colleagues and their own conscience. They receive no secure position with their appointment, but merely the right to make one. They can enter Harley Street, Rodney Street, St John Street, or Park Square, and because the public is firmly convinced that these places are distinctions rather than addresses, that they imply unusual excellence rather than the ability to pay rent, they will be accepted as consultants. But they must rely on the quality of their work to establish the position they have assumed. For the practising surgeon will find that not more than 5 per cent of his work comes to him automatically because he is known to be on the staff of a certain hospital or from his old students as such, the remaining 95 per cent comes through satisfied patients, their friends or doctors, or from knowledge on the part of others that his results in some line are good. Work will come to him in proportion as he deserves it, and leave him when he ceases to do so.

The atmosphere in which British surgery is conducted is thus one of almost unlimited freedom. In place of a few privileged and selected surgeons, doing much of their work by delegation, we have a large number of surgeons working as individuals, and, because of the many hospitals of all sorts in which practice may be obtained, and the absence of any kind of bar to surgical

practice, there is no limit to the number who may enter the field. What grading there is, is by a process not far removed from natural selection. There is a continual scaling both up and down. The man who has entered surgery, being unsuited to it by skill or temperament, cannot maintain his position, while on the other hand the good man cannot be kept down. Every man is free to work, unhampered by patronage or dictation, or by the rulings of orthodoxy or tradition. Each has, it is true, been trained in the tenets of a certain school, or rather of the surgeon with whom he worked during his most impressionable years. But upon this framework he erects an individual structure, pieced together from his own ideas, from the books or articles he reads, from the discussions in which he takes part, or from the lessons he brings back from visits to other British or continental surgeons. He will build up his own doctrine and his own technique and in proportion as these are sound and acceptable, so will he build up his own practice. But his practice will always be a personal one, limited to the amount of work he can do himself and the number of patients he can care for personally. He will never become the head of a surgical factory, stepping in to do one phase of an operation which his assistants begin and complete, or laying down principles of treatment to be carried out by others. His contact with his patients is therefore personal, and to him they remain individuals. They are not 'gastric ulcers' or 'goitres' to be treated by the method of the moment, but Mr. Smith and Mrs. Jones, whose diseases are isolated problems demanding the particular type of operation that appears best suited to their individual needs.

Where such men practise surgery and such individual contact rules, patients are treated as human beings. The hospital is designed not alone for austere efficiency, but to be a comforting and cheerful place. Its wards are bright with flowers. The operation is no *tour de force* but one step in a course of treatment designed to get the patient well. Investigation is painstaking, preoperative preparation carefully considered, postoperative treatment planned with the same thought as the operation itself. With personal surgery, good anaesthetists and good nurses are indispensable, and these important members of the surgical team

are probably more skilled and scientific in the English speaking countries than in any others

In such an atmosphere of wide opportunity and unrestrained development, surgery can bring forth its best fruits, and it is an undoubted fact that the general level of British surgery to-day is one of which we may well be proud. An outstanding figure may arise at any time in any country, a man who seems to draw his inspirations, not from his surroundings or his upbringing, but from a unique combination of qualities that stamp him as something apart. Such a man is Kirschner of Heidelberg. Apart from the work of this remarkable surgeon, however, I have not yet seen any branch of surgery so well performed on the continent that it cannot be seen better done in England. Our man may not be so well known, his figures may be smaller, his surroundings are probably less dramatic, but his work combines the best of continental practice with a thoroughness and individual adaptation that are peculiar to this country. And his results are correspondingly better.

But if the best surgery in Europe can be seen in Britain by those who know where to look for it, so can the worst. The opportunity offered by this multiplicity of hospitals, and the absence of any recognition of surgery as a specialized branch of practice either in law, custom, or qualification, allow those with no training of any kind to undertake it. They are inclined to do so by motives that in themselves are intelligible and even praiseworthy. They will often confide in moments of expansion that they 'like to do a spot of surgery occasionally' as they would say that they 'like to play a spot of golf'. The incentive is the same, a desire to escape from the tedium of routine work, and no criticism could be offered were not the game played with human lives as pawns. Courage remains, even in our sheltered times, one of the most highly esteemed of human virtues, but to rank as a virtue at all the danger must be the hero's own. For a man to undertake work beyond his skill is not courage, for simplicity can never be guaranteed in any surgical operation. The ordinary looking hernia may contain bladder and caecum in the walls of the sac, the fibro-adenoma of the breast may be a malignant tumour, the pains in the right iliac fossa may be occasioned by an intestinal strangulation or carcinoma rather than a chronic appendix. The results of

rash surgery reach the large hospitals in numbers that increase yearly—malignant breasts with wide dissemination caused by a previous incision, gall bladders drained without the removal of the key stone at the ampulla of Vater, abdomens opened and closed hastily arriving full of adhesions and a month too late. Too often the patients do not survive to obtain corrective surgery. Operating as a sport is a purely British conception, and its home is the cottage hospital. In so far as these small hospitals afford a pretext for this reprehensible hobby, in so far have they become a menace.

The national spirit of British surgery is such an admirable possession, and productive of work of such a high level, that we would not change any of its essential characters.¹ The small hospitals supported and governed by able and unselfish men and women, and offering opportunities to all those who are willing to undertake the necessary preparation for serious work, provide a soil in which the best surgery of every kind, and not alone that officially approved and certified, can grow and flourish. If we are not to lose this heritage, and acquire in its place the large continental unit with its mechanical precision and cast iron orthodoxy, we must see that it remains worthy of the support of the coming generation.

We can, in these days of perfected transport, afford skilled surgical care to every man in the British Isles, we must see that he gets it. We can allow every medical man who has the intention to practise surgery to acquire the necessary experience and skill, we must see that he has the opportunity, but we must, in the name of the trust we hold for our country's reputation and our countrymen's safety, abolish the potterer.

The decentralization of surgery is in progress, and should be welcomed. Harley Street has lost its magic, and even those who practise in its dreary barracks must welcome the change, for the artificial stamp of excellence which it confers has attracted to its neighbourhood every consultoid and confidence trickster who can afford the rent of a room. We should ensure, however, that in every town and village where surgery is practised there is a man well versed in its art and craft, if not necessarily in its science. We should give him opportunity to acquire and maintain his

¹ This essay was written twelve years before the National Health Service.

7 THE AMERICAN SURGEON

(Final pages of a diary kept during a visit to America in 1937 and published in the *Guy's Hospital Gazette*)

THE good American is courageous, independent, self sufficient, distrustful of tradition, a pioneer by instinct, able to make quick decisions and to act upon them. He has also a genuine sympathy for his fellow men, particularly if they are ill or down on their luck. When a man of this stamp undertakes surgery under ideal conditions, in theatres beautifully built and lit, helped by expert anaesthetists, assisted by a large team of skilled graduates, and served by a theatre sister straight from heaven, his work is such as to fill the visitor with admiration and envy.

The great men in American surgery are operators of a standard that could not be surpassed anywhere, but in a visit of this sort it was inevitable that I should see poor technique as well as inspiring work, and that some of the well known names should prove disappointing. The factors that favour good work in America are self evident, two adverse ones deserve comment.

One is the remarkable lack of any individuality in instruments. The tendency of the country is to mass production, and mass production gives everybody goods of admirable finish and appearance, and of remarkable quality for their price, but it militates against personal adaptation and fine workmanship. The surgical instruments in most American theatres are of a simple standard type, usually German factory goods produced from stampings and imported wholesale, and the selection is remarkably limited, for instance, in several hospitals one sees gall bladder surgery undertaken without any angled forceps. There is no firm comparable to Downs, specializing in high-grade craftsmanship and individual work.

The second factor, that I class as adverse only with considerable hesitation, is the Halsted tradition. Halsted was one of the giants of the last generation and, like many great men, he left behind him admirers rather than followers, much in the same way as MacEwen sterilized the surgery of Glasgow for a generation.

ideal, carried to its extreme, is the 'letter that killeth.' A dissection of the axilla with a knife is distressing to watch, the surgeon takes more than an hour to do part of the operation for which we should need ten minutes, and, more important, the vessels and planes are not nearly as clean, there is more bleeding, and, to any eye but that of faith, more trauma. Complete haemostasis again should be the ideal of every gentle surgeon, but the man who goes on happily, hour after hour, dabbing and tying, tying and dabbing, in the same spot, where no bleeding can be seen and certainly none would occur when the surfaces came together, is straining at the gnat of haemorrhage, and swallowing the camel of exposure to cold, drying, and prolonged anaesthesia.

It is idle to pretend that I got more than a few glimpses of American surgical teaching, but the impression I formed was that while their graduate teaching was much better than ours, their undergraduate teaching was inferior. In England we do not really teach our graduates at all, once on the register they have to pick up what information they can working as house surgeons, clinical assistants or registrars, but there is no attempt to make them think or read, and no instruction apart from cramming courses for particular degrees. In America the 'interns' are trained to present cases and discuss aspects of their work in public. The best known examples of this public discussion by juniors is the staff meeting at the Mayo Clinic, and at every hospital a similar system is in existence. But the undergraduate teaching seems, according to our standards, to be too systematic and not enough personal. They do not seem to place the same value on rehearsing the elements of clinical examination, on physical signs, on a careful case history. They do not let the student go ahead till he is stuck and then help him out. They do not force him to make up his mind before some senior or some laboratory test makes it up for him, nor do they give him the character-making experience of a responsible job with veiled supervision while he is yet learning. Where we would say in a ward round 'This woman was admitted with appendicitis, the pathology and the typical story is a thing you have probably acquired from your textbooks—if not, go and read them and ask for help if you need it, the particular lessons we can learn from this case are "so and so",' they would say 'This woman has

appendicitis,' and use her as the text for a talk on appendicitis, stressing particularly pathology, laboratory methods of diagnosis, and operative surgery, and dealing with work published in the last year or two. This outlook reflects the close link between the American schools and those of Germany. German surgery is based on the laboratory and operating theatre, but rarely approaches the bedside, it produces superb surgical pathologists and brilliant operators, but few clinicians or clinical teachers of any importance. The school of practical medicine based on the study of the individual patient, which has produced men like Gull and Wilkes in the last century, Osler at the beginning of this, and Ryle and Symonds to day, has no counterpart in Germany, and few representatives in America.

American students appear to be taught didactically, and their training in responsibility comes later, and possibly too late. I am inclined to feel this way by an impression gained of the type of men in general practice turned out by the system, men of the highest integrity and ability, but lacking in personal judgment and critical outlook. The kind of talk that is handed out to them at meetings is often of a type that should not be offered to intelligent men. The many textbooks that are published and apparently sold, consisting of a very thin skeleton of facts clothed in a large body of verbiage and pseudo science (witness many American books on fractures and industrial surgery that can be bought in England), could only find a market with a public taught to believe rather than to find out.

A Bart's man whom I met in St Louis, remarked that 'American surgery is like American football, they run about like hell for ten minutes, and then stop and have a huddle.' His observation is the most penetrating summary of American life

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A Bart's man whom I met in St Louis, remarked that 'American surgery is like American football, they run about like hell for ten minutes, and then stop and have a huddle.' His observation is the most penetrating summary of American life and character that I have heard. To one who has watched American football, with its extraordinary demonstration of organized mass enthusiasm, its atmosphere of fierceness conveyed by the shouts and clash of two teams dressed in helmets and body armour, its sudden stops after five minutes of tumult and shouting to allow the side with the ball 'to go into a huddle' and plan the next strategy, the simile is exact. The American surgeon does work like hell—and then some. One whom I have discussed at length gets up at five every morning, goes to bed at nine, and,

while at work, takes no part in any social activity. He spends an hour before breakfast every morning with his statistical secretary bringing the figures relating to some branch of his activities up to date, and in the evening when he is finished with patients, he goes straight to work at some lecture or article. All of them start operating at seven or eight in the morning and get through tremendous lists. The day, punctuated by simple meals snatched at the hospital cafeteria, is spent in lectures, staff discussions, or more informal meetings. Private patients take up time, but as these are all in a wing of the same hospital none is wasted in transit. Yet any visitor is welcomed by those busy men, not only welcomed, but overwhelmed with kindness and information. Everything—operating, teaching, lecturing, entertaining—is done at top speed and with the most whole hearted concentration. No British surgeon attempts to work so long or at such a pace, no living surgeon could keep it up and go on living. But they do not often keep it up for more than a fortnight at a time.

The other side of the picture is the conference or convention. British surgeons have only two opportunities of meeting in the year, the Association of Surgeons in May and the British Medical Association in July, and each of these takes the mornings of three days. In America there is some large gathering going on every week of the year, and the big men in surgery seem to attend about half of them. At meetings three or four thousand miles apart and separated by only a week or two, the same men will be speaking. But such journeys and such distances are a rest to the busy man after the routine work. A trip across the continent means three days of comfortable Pullman travelling, with a really good bed at night, a 'club car' for relaxation in the day, and a *la carte* meals delightfully served. The lecture he is going to give has been put into his bag in the rough form of figures and lantern slides by his super-efficient secretary and will not weigh on his mind. After three days of complete relaxation he arrives at the meeting and stays at a hotel of the utmost luxury, where he meets many of his old friends. He must take the stage, and he must see that he meets many people with whom he has matters to discuss, but he is not on duty and not leading his team, and he is thoroughly happy. The same man who, in his home town, rises at five and lies down at nine, becomes for a brief week a playboy,

a cheerful companion, a retailer of delightfully humorous stories with a faintly blasphemous tinge. The meetings over, he and his fellows return, giants refreshed, to the grim task of American surgery.

These periods of relaxation are made possible by the lavish organization of the American hospitals, which have the strong points of the voluntary and State hospitals—the independent outlook, efficient organization and picked staff of the first, the material benefits of the second. The majority owe their origin and equipment to voluntary supporters, but the expenses of maintenance are proportionately small, they are not taxed or rated, they receive adequate State grants for the poor they treat, and they have a very high proportion of pay beds. They thus have much more to spare for equipment and executive staff, and further, since it is known that subscriptions are not for mere maintenance or reduction of debt—unattractive objects of charity—they find it easy to get gifts of money, apparatus, or buildings for special purposes. The unit which an American surgeon leads is, therefore, a large and highly efficient one. He has every material assistance he needs, his records are faultlessly kept, and any conceivable information he may require about his patients is instantly available, he has the services of artists and photographers to keep pictorial records of his cases and operations and to prepare slides for his lectures and illustrations for his articles, and he has a number of senior assistants, anxious to work at any problem he suggests, able to tackle the most intricate operation in his absence or give any of his lectures at an hour's notice, yet not in a position to raid his private practice. So as he sits in his Pullman chair and lights his cigar he can look forward to eight or ten days of carefree existence unmarred by any anxiety as to what may be happening while he is away, or how his practice will fare when he returns.

It is a platitude to remark that America is a young country and that the Americans keep many of the qualities of the child. They are restless, full of abundant energy, basically simple in outlook and taste, slow to think or speak unkindly of anybody, always asking questions, always anxious for approval, delighting in anything new because it is new, amused by humour of the practical schoolboy type. It follows from this charming and

youthful exuberance that they take people as well as things very much on trust, are prone to accept the man who is good at 'selling himself' at his own face value and to underestimate a much greater man who works in silence and reports his discoveries only when he has checked them in every detail. This shows itself, not only in the fact that several of their own countrymen seem to enjoy reputations and to have secured appointments beyond their real desert, but in the exaltation of some of our surgical visitors, who are very small beer over here, to a position that pays tribute to their assurance rather than their merits. But it follows also that the stranger, however unworthy, will always meet a warm welcome, the discouraged and disillusioned will draw fresh supplies of energy and hope, and the inquiring surgeon will find, if not the answers to all his problems, at any rate an indication of the way the answer is to be sought in the example of these men who are treading so gaily and fearlessly into the future.

8 CLINICAL SURGERY¹

(*Guy's Hospital Gazette*, 1935, 49, 457-62)

I AM frequently asked by foreign colleagues whom I visit, or who visit me, for a list of first class surgeons, a request with which I readily comply, giving the names of those men in London and the Provinces to whose clinics I repair whenever I get a chance, from whom I have learnt much in the past, and who will always have something new to teach me when I go again. But if I pause to consider the question in all seriousness its difficulties appal me. What is a first class surgeon and how may we judge him? Most surgeons pass through three stages. In the first they are young and enthusiastic, stored with an immense amount of information that they have acquired in passing their Fellowship and Mastership examinations, full of ideas that they mean to work out, safe and skilful but stereotyped operators, very poor and entirely unknown. In the second their knowledge has been coloured by personal experience, and if they are made of the right stuff, has been built up into surgical wisdom. Their ideas have been cultivated and have borne fruit in contributions to surgical science, and in a more general way in an outlook that is their individual contribution to the store of their time, their technical work is polished and perfected by constant practice, the elimination of unnecessary steps, and the adoption of all that they consider best in the work of others, and the knowledge borne of experience which teaches the particular device best suited to the particular problem, they get plenty of patients from those who know the value of their work, and they make a reasonable income, most of which is spent in educating their children. In the third stage we may picture them graced with a title, operating for large fees on the nobility and plutocracy and enjoying a brief period of real prosperity, rising with a fortunate few to a third of the income of a successful barrister, they have ceased to modify their ideas and their operating is perfect and standardized. It is during the second of these periods

¹ A Clinical Lecture delivered at Guy's Hospital.

that a surgeon will be first class if he is ever going to reach that distinction, but it is very difficult indeed to hear of these men during the time they are at their best. In common with many others whose hobby as well as whose work is surgery, I would give a great deal to be able to hear of the men in whom the divine fire is still burning brightly, so that I can learn from them something that will improve my own work. But the lists I get from my informants contain the names of the giants only, and I find that much of my time is wasted in gazing at ancient monuments and listening to the rumblings of extinct volcanoes.

What, then, are the marks of the really great surgeon? He must, I think, be judged on at least five separate counts—knowledge, originality, clinical judgment, operative skill, and the ability to communicate his views to others. I have often amused myself by trying to construct a ranking list of British surgeons, based upon these criteria, a list similar to that of tennis players which is compiled by the L.T.A. My principle is to award marks on each count: 10 for knowledge, 30 for original work, 30 for clinical judgment, 20 for operating, and 10 for teaching and writing. To reach the first class a surgeon must obtain 80 marks. Only eight in my various test examinations have hitherto been passed in the first class, three in London, three in Edinburgh, and two in the Midlands, but this somewhat depressing pass list is qualified by two observations, that I have only seen a small proportion of the men in the intermediate period from which I should expect to draw the majority of my stars, and that my system of marking is my own. Had I given, as many will, 50 marks for operating, I could make the roll of honour a large one. But I cannot see that the skilled operator is any more a great surgeon than the skilled car driver is a great engineer. The three best technicians I have known are poor surgeons, while many of the names that will live in history were mediocre operators. Robert Jones was no more than adequate in the theatre, Lister and John Hunter were, I understand, but indifferent performers with their hands.

I have marked clinical judgment very high, as high as original work, because it is the sound and wise clinician who becomes the leader among his fellows. Clinical judgment implies force of character, real innate wisdom, human interest and experience.

The clinician is the man to whom we all go when we are ill, to whom we turn for advice when we are puzzled, who becomes the natural leader among men who may have greater intellects than his own, he is more likely than the thinker or technician to contribute really important advances to our knowledge, for it is in the collecting of scattered clinical observations that new lines of research are initiated, new diseases isolated, and improvements in treatment effected

The clinical sense is a quality that we recognize easily in our fellows and our teachers, yet it is *surprisingly difficult to define*; the good clinician may know no more than we do, he may be inferior to us in degrees, academic qualifications, and medical school prizes. He sees the same cases that we do, elicits the same history, and makes the same physical examination. But to his inquiry he brings something more, having heard the history he proceeds to ask questions in an orderly manner, seeking to elucidate certain trains of thought that the facts hitherto presented to him have started in his mind, he supplements the routine examination by the search for other signs, the presence or absence of which are to be the deciding point in his opinion. Having finished his examination, he can present us with his conclusion in a manner that is always orderly and usually illuminating. He will summarize the history and the findings, laying his finger on the essential points, he will be able to tell us whether the diagnosis and treatment are clear, and, if so, why, if not, he will emphasize the possible alternatives, which of these we must guard against, and which are of less importance, he will have decided whether the case demands immediate action, a search for further facts such as X rays or some laboratory investigations, or whether the progress when under observation will provide the key to *the riddle*. Such a man is always helpful, and nearly always right.

Some years ago I took part in one of those mass consultations which only the very rich or the very important are unfortunate enough to demand. *I say this with no trace of cynicism, for when many experts meet together, either they agree, in which case the same verdict would have been reached more quickly and cheaply by one of them acting alone, or they disagree, and the line of action finally decided upon is not the clear cut and definite*

decision of one mind, but a compromise representing the modicum of agreement remaining after conflicting views have cancelled out. In this case the patient was an eminent scientist affected with severe diabetes, and also the victim of an enormous carbuncle, which had been excised. There were present besides myself, a pathologist, a bacteriologist, two titled physicians, another surgeon and the general practitioner. Discussion ranged around cardiac stimulants, vaccines, staphylococcal sera, injections of colloidal metals, intravenous antiseptics, immuno-transfusions and further surgery. (This was before the days of chemotherapy.) We had before us charts, and blood tests of every description. Meanwhile Lord Horder sat by himself studying the nurse's report book, and elucidated the clinical fact that was of far more importance than all these laboratory measures—that the intake of fluids had for some days been grossly insufficient, and that the urine output had fallen to 8 to 10 ozs. in the twenty-four hours.

Clinical sense is in its essence practical wisdom, a very different thing from knowledge. 'Knowledge dwells in heads replete with thoughts of other men, wisdom in minds attentive to their own.' Knowledge is, of course, essential in our profession, but it is the assortment of amino-acids from which the personal proteins of clinical wisdom must be built up by synthesis. Knowledge comes to us from books and lectures, from the study of pathological processes, but upon this information we must build a further edifice that we can only construct for ourselves out of our experience. We must know not only the types of disease—inflammatory, degenerative, neoplastic, the pathological anatomy, symptoms and signs of appendicitis and carcinoma of the breast, we must learn to know what diseases to expect in either sex and at certain ages, or in patients of some particular appearance and bodily habit. We must learn many things that can be acquired only by personal observation: the smell of uraemic breath, the look on the face of a patient with general peritonitis, the mental attitude of an early Graves' disease, the appearance of the vomit in acute dilatation of the stomach, the voice and cough of an abductor paralysis of the vocal cord. We must know instinctively when a patient is really ill, when one who was progressing

well has become worse, or when one who had been ill has **taken** a turn for the better

Clinical wisdom in its essence is case memory. It is built upon and amplifies the surgical knowledge we derive from teaching and textbooks, in much the same way that case law expands and elucidates the acts upon the Statute Book. Certain legal principles are laid down from time to time, but their full interpretation is only attained by the practical experience of the law courts in individual cases. Clinical wisdom can, in the same way, only be learned at the bedside and in the Out Patient department. We must not merely see all the cases we can, we must study them, and in proportion as we turn them over in our minds and marshal the facts we learn, and by building the conclusions we deduce from these facts into something of our own, in so much will we become wiser. In this connexion a few cases properly studied will serve us better than a much larger number merely looked at. To get the greatest benefit we must examine each case thoroughly, think it over, talk it over, read it over, and commit ourselves to some definite decision. Whether that decision be right or wrong, in either case we will have learned something which we will remember.

This brings us to the side of the patient and to clinical methods. But again I must insist that clinical methods are only the means of obtaining certain information which the mind has then got to use. The mind is the one instrument which becomes sharper and not blunter with repeated use.

First, and usually most important, comes the history. The barrister asks questions of a witness to extract the answers that suit his case. The doctor is seeking truth, and this should flow without extraction. He should listen and not ask questions. Any questions should wait for the time when the patient has told his own story, they should be reserved for the elucidation of facts which have been omitted, and they should never suggest their own answer. Thus we should ask 'Has your weight altered?' rather than 'Are you losing weight?' 'Does the pain come on at any special time of day?' rather than 'Is the pain related to meals?' and 'Have you noticed any difference in the motions?' rather than 'Are the motions pale or do they contain blood?' To listen to a story often requires great patience, but the sequence

of events as told by the patient without assistance will often contain some illuminating observation that will shed invaluable light upon the problem. A long series of such spontaneous case histories, carefully listened to and as carefully recorded, may even help us as we get older to add to the sum of clinical knowledge, and to differentiate diseases which have hitherto escaped recognition.

While you are listening to the patient's story, your eyes and your ears are also summing him up. By the time he has finished the narrative you should have a good idea, not only of the trouble that has brought him to see you, but of what manner of man he is. This knowledge of human beings, call it garden psychology if you will, is a matter of first rate importance, for it gives the touchstone which will help us to assess the value of the whole clinical picture. What is an ache to one man is an agony to another, and a degree of tenderness that will allow a confident diagnosis of appendicitis in a placid and sensible young woman may be of no significance in a neurotic and self-centred girl. We must, however, beware of labelling anybody as neurotic without careful consideration. Axel Munthe, in *The Story of San Michele*, refers to 'le malade au petit papier,' whose chief symptom is a list of complaints carefully written down, lest he forget even the smallest of them. These tabulated woes are usually imaginary, for real suffering requires no reminder. But it sometimes happens that the conscientious and self-effacing man who is really ill will come thus prepared, not because he wishes to present you with an imposing list of ailments, but because he is desperately anxious to avoid wasting your valuable time, and wishes to give his story in as consecutive and orderly a manner as possible.

You will also have been looking at the patient while you have been listening to him, and will have observed such things as evidence of recent wasting, in a loose collar and flabby skin, traces of suffering, the pallor of anaemia, the marks of mental anxiety. You will be saying to yourself, 'What is a patient of this sex and age and with this appearance likely to have the matter with him?'

Following the general survey which accompanies the taking of the history, we proceed to inspection, to examine with our

eyes those parts of the body which the history has suggested *may* be the seat of trouble. I have not time to discuss the *many* things that may be seen with the eye—shape, symmetry, colour, movement, but I must remind you that sight is appreciative of far finer distinctions than touch or hearing. The impulse of a small hernia can be far better seen than felt, the swelling of a deep seated abscess, such as one in the perinephric fat, is more obvious to the eye than to the finger. There are, however, three rules that we should endeavour to follow *examine the whole patient, examine the whole of a system, and compare the two sides*

Errors frequently arise from a failure to look on the patient as a whole. As I entered the room for my clinical examination in the Final Fellowship, I passed by the end of a bed on which lay a patient allotted to a great personal friend and fellow registrar. I noticed an ulcer on the sole of the foot. My friend was asked to examine a fluctuating swelling in the groin, and, failing to lift the blanket and examine the whole lower limb, he missed the fact that this swelling was a cold abscess in a lymphatic gland, secondary to a tuberculous lesion of the plantar skin. Another of my fellow candidates was presented with a mass in the epigastrium, clearly malignant, he also failed to uncover the lower parts, which had been covered, perhaps for decency, perhaps for warmth, this patient's right testicle had been removed three months previously for a teratoma.

We must also remember to examine the whole of a diseased part, be it a limb or a system. The investigation of a case of enlarged glands in the neck is not completed by an examination of the field which we know is drained by these glands, we must also review the remainder of the lymphatic system, the glands in the axilla, groins and abdomen, and the associated glands of the reticulo-endothelial system, the liver and spleen. An obscure disease of one joint may be made clear by looking at the other joints, of a bone by reviewing the rest of the skeleton.

Comparison of the two sides of the body is a precaution which may seem elementary, but whose omission has led to countless *errors*. There is no such thing as a normal human being. The Venus de Milo, the perfect female form to the Greeks, would to-day be suspected of gall stones, the nose of Apollo is now seen

only in patients who have had a cartilage graft. Relative proportions of the parts of the body, muscular development, and range of joint movement, each vary from individual to individual, and each can only be called normal if, besides falling within average limits, it tallies with that on the other side. Failure to exercise such a check has led to the extensor brevis digitorum of the foot, the vastus internus at the knee, and the teres major, being incised as abscesses. I have seen a patient, who had sustained a minor injury to the wrist, immobilized in plaster for six months as a fractured scaphoid. A radiogram of the sound wrist showed a similar condition, which was merely a bipartite scaphoid—a persistence of the os centrale which is found in some apes—to be present on the other side.

By palpation we obtain further information about our patients' bodies through the sense of touch, and we also elicit certain reactions on their part, such as hyperaesthesia and tenderness. We are all accustomed from childhood to use our eyes, though the faculty of observation is acquired, but the sensation of touch varies enormously in its acuity from individual to individual. It is said that some cardsharps can feel the pips on playing cards, and that burglars can trace the movements of the tumblers in a lock by sensing their fall. A highly developed tactile sense is part of the equipment of the skilled clinician, this we must strive to acquire by constant practice, by developing tactile discrimination, and by learning to recognize the feel of familiar and rare conditions by frequent contact. Such education is a matter of developing association tracts between the finger and the brain, as we speedily realize when we are forced by some accident to use an unaccustomed finger for rectal examination.

To educate our sense of touch we must proceed on a system, carrying out our examination in an orderly and purposeful manner, feeling everything once, and only returning to settle some doubtful point. Nothing looks worse than to see a student pinching a painful breast time and again while he talks to the examiner, learning nothing, but hurting the patient. The principle of systematic palpation is the crescendo, to proceed from the superficial to the deep, and from painless manipulations to painful ones. Taking the abdomen as an example, we should first examine the skin for evidence of wasting, for localized heat, and

for hyperaesthesia, then the muscles, for guarding, then we should examine more deeply with the flat of the hand, comparing the two sides, first the subcostal regions, bearing in mind the liver, gall bladder and spleen, then the epigastrium, right and left flank and umbilical region, then the iliac fossae and hypogastrium, then the renal regions, we should next examine more deeply and locally with the points of the fingers, for large tumours will be felt with the flat of the hand more readily than the fingers, and small ones preferably with the fingers, lastly we should seek for tenderness. In examining the abdomen we must remember that a large and important subdivision can be reached only through the rectum or vagina. In the limbs we should examine first for shortening, wasting and heat, then for spasm and movements, then for abnormality of outline or synovial thickening, and last of all for tenderness.

Percussion and auscultation are possibly less important in surgery than in medicine, but we should never omit to reflect whether we may, by such means, increase the store of facts upon which our decision must be made. By percussion we can determine the outline of the liver, the presence of free gas or free fluid in the peritoneal cavity, the size of the stomach and the caecum, we can decide whether the trachea has been displaced by a goitre, we can tell whether an appendicular abscess is in contact with the abdominal wall or still enclosed in coils of gut, and we can distinguish between a hernia and a swelling containing pus. Auscultation may allow us to differentiate a haemangioma from a lipoma by the sound of blood rushing through its vessels, and to determine whether a patient is suffering from peritonitis or intestinal obstruction.

There are many other methods of clinical examination which I have not the time to touch upon, but you will employ any which can possibly yield one more fact to help you to a diagnosis. And that diagnosis you must make, and, for the good of your clinical souls, you must make it certainly and irrevocably, preferably on papers, 'with reasons for your choice'. It is only too easy to avoid such commitment, by keeping several alternatives up your sleeves and saying, 'This may be a, b, or c', by postponing decision until appeal has been made to some laboratory test, or by waiting until the case has been diagnosed by your seniors.

Thus way lies clinical futility, for your own purposes it is far better to be sure than to be right. While you are a student the diagnosis will not rest with you alone. Somebody more experienced will discuss the problem, in which case you will probably know the truth, or the patient may come to post-mortem or to operation, when you will certainly know it. Then, whether you were right or wrong, you will have learned a lesson, you will remember it, and you will be wiser. But if the answer coincides with one of your many 'might have beens,' you have merely increased your unfruitful complacency and learned nothing.

I cannot tell you how to make a diagnosis, but in your review of the facts as you collect them and when you have assembled them, two questions will be passing through your mind 'What is the anatomical site of the trouble?' and 'What is its pathological nature?' A correct reply to either question will go a long way to answering the other, for each organ or tissue has its own diseases, and each type of disease has certain sites of election. If you are certain that a swelling in the neck is an enlarged cervical gland, you have, for practical purposes, only to distinguish between chronic sepsis, tuberculosis, Hodgkin's disease and secondary malignant disease in order to make a diagnosis. If the swelling is a cold abscess, the site of its origin will be either in the glands or the cervical vertebrae. Bear these two questions in mind throughout. The history may answer one or the other. The characters of the pain will, for instance, in many cases, indicate unmistakably the site of its origin, its anatomical distribution may point clearly to the kidney or one of the peripheral nerves, its association with food to the stomach, or with micturition to the bladder. The history again may indicate the nature of the lesion, progressive loss of weight, strength and colour without any other symptoms in a man of fifty suggest a cancer somewhere in the abdomen, and our thoughts turn to stomach and colon, intermittent severe colicky pain suggests a mechanical obstruction, a constant dull ache points to an inflammatory lesion, in each case if we have already deduced the organ involved, our choice of diagnosis lies within narrow limits. While making the physical examination we have the same two queries in mind. A swelling connected with the carotid sheath cannot be moved

vertically, nor will it do so on swallowing, but it can be moved from side to side unless the sterno mastoid is made to contract, when it will become fixed. An enlargement of the thyroid will rise on swallowing, and can be pushed up and down, but very little from side to side. Both characters are a sequel of the fascial connexion of the two structures. Enlargement of the kidney and spleen is unmistakable, if we find certain characters about them. The pathological nature, too, of a swelling will often follow from its physical characters. A cold, painless, fluctuating swelling on the surface of the body, dull to percussion, will be a synovial or lymphatic dilatation if it is translucent, a cold abscess if it is opaque. As your knowledge of disease increases with experience, your selection will, in each case, become more accurate. Diseases are many, but all come into five groups—the developmental, the traumatic, the infective, the degenerative, and the neoplastic. Bearing this simple list in mind you can make a diagnosis in every case, and if you make it with careful thought and due reason, and commit yourself to that as your opinion, you will have gone far on the way to lay the foundations of clinical wisdom.

I should like to conclude by a few words on the value of association. We may receive information by the ear or the eye, but we do not acquire it unless we fix it by association in the cerebrum. We may sit by the wireless while a lecture pours out of the loud speaker, but the words achieve no more than a *temporary stimulation* of our auditory centres. We may hear the same lecture under other circumstances, and something, the personality of the speaker, some apt illustrations or experiments, or the surroundings, serve to fix every part of it in our memory. Our sources of information, therefore, should not be too copious for attention, and they should be carefully chosen and diligently used. Do not read too much, but take Bacon's advice 'Read not to contradict and confute, nor to believe and take for granted, nor to find talk and discourse, but to weigh and consider.' *And take a similar course with your teachers.* A man who once interested you ceases to do so, you have become familiar with his voice, his point of view, his favourite stories, and though you continue to listen you have ceased to associate, and therefore to learn. Go to someone else, and in another ward listening to a

fresh voice you will remember teaching that from the former source would have been soon forgotten. I, for one, hope that the interchange of teachers and students which is now undergoing tentative trial in a few London hospitals will be developed to its full, so that we may in the end attain the full freedom of the German universities.

9 DELAY IN SURGERY¹

(*Guy's Hospital Gazette*, 1930, 44, 298-303)

MOST of us are so familiar with the dangers of delay in acute surgical conditions, that we run very little risk of falling into the error of procrastination. We have been taught to recognize the emergency that requires prompt action, to make our decisions quickly, and to carry them out expeditiously. It is not often, however, that we allow our minds to dwell on the reverse side of the picture, the advantage of delay. Yet it cannot be too strongly insisted that the first point a surgeon should consider is whether any operation is required at all, whether 'do nothing' is not the best advice in the interest of the patient. Operating has become so easy, and its implements and procedures so standardized, that most men when they leave hospital are quite capable of performing a large number of operations safely and well at a time when their surgical judgment is yet immature. With experience, the responsibility for deciding whether operation is the best form of treatment comes to assume first place, the choice of operation becomes a subsidiary question.

The last twenty years have seen many diseases and many parts of the body, which were formerly immune from surgical interference, brought within the scope of operation. They have also witnessed a general reconsideration of values. It has been realized that in many conditions, where treatment by operation was formerly the rule, the resulting advantage which accrues to the patient is not enough to counterbalance the pain and the risk. The surgery of tuberculosis of bones and joints has almost disappeared during the period mentioned, that of tuberculosis of the cervical glands is fast following the same way. Large and heroic resections for advanced growths of the tongue and floor of the mouth are now rarely carried out. There is a general tendency in the surgery of cancer to realize that operation in late cases may often shorten rather than prolong the patient's life, and make the remaining period more, rather than less, unhappy.

¹ A Clinical Lecture, largely rewritten

But I do not wish to discuss the class of case in which operation is definitely to be abandoned, but to consider that larger group of conditions in which it is wise to stay our hand, either till it is clear that operation is the best treatment in the interest of the patient, or till the most favourable moment for operation has arrived

1 Delay may be necessary to establish a diagnosis

We all encounter cases, where symptoms and signs suggest a condition demanding operation, but where the diagnosis is not absolutely clear. In these circumstances it is often the wiser course to 'wait and see,' provided always that our waiting is active and not passive, and that we are prepared to see, not only the first signs pointing to a clearer understanding, but also the first indication that waiting cannot be safely prolonged. Time is the third dimension which gives perspective to the clinical picture, and tells us how the many factors which we observe are changing and interacting.

We may be called to a young man who has been seized a few hours before with colicky abdominal pain, and who has since vomited. A meal had been taken shortly before, but no suspicious food can be traced. There is no hernia, nor can any cause for obstruction to the gut be detected. He looks well, and his temperature and pulse are normal. We may be dealing with an acute gastro enteritis from some unsuspected article of diet, or with obstruction of the small intestine by a band, an internal hernia, or an impacted foreign body. Only a brief period of waiting can clear up the diagnosis.

In the first place, a patient with such a history must be admitted immediately to hospital for observation. An enema must be given, but some gas and faecal matter will almost certainly be recovered with the first enema, and if improvement does not occur, a second will have to be given. The pulse rate must be recorded frequently and the abdomen watched for visible peristalsis or increasing distension. A plain skiagram of the abdomen must be taken, and if the film shows gas filled coils of small intestine, or fluid levels in the upright position, a diagnosis of intestinal obstruction must be made. Auscultation should also be practised, for the increased peristaltic action of the intestine

can be detected by the ear earlier than by the eye or the hand. The decision is materially hastened by giving fluids by the mouth. If there is an obstruction, the vomiting will be made more insistent, but the diagnosis will be the more easily established. As long as we keep the more serious alternative uppermost, and postpone rather than abandon our diagnosis, we shall not jeopardize the patient's chances

In occasional instances, the exact diagnosis of a tumour in the breast may be impossible when the patient is seen for the first time, and only by allowing a short interval to elapse can we determine with certainty the nature of the tumour, and decide upon the appropriate treatment. Here, I know that I am treading upon dangerous ground. We are all familiar with cases of advanced cancer who tell us that several months before, when a small lump was first noticed, they were told that it was quite harmless, and that they were not to worry, but to come again if it got any larger. Every solid tumour in the breast in a woman over twenty must be presumed to be cancer, unless we have convincing proof that it is not so, and such proof is almost invariably microscopic. The cases in which delay is justifiable are rare, and even then the diagnosis of cancer is kept uppermost, and waiting is anxious, purposive, and never prolonged beyond a fortnight.

A young woman of twenty eight came to surgical out patients in 1929. She had given birth to a child six months before, and had suckled it up to the time of attending hospital. A month earlier she had had some soreness round the right nipple, and this breast had begun to ache. After about a week, she noticed a lump in the breast which had slowly grown larger. Upon examination, the right breast was seen to be a little fuller than the left, but its contour was smooth and rounded. The nipple was not raised, retracted, or deviated. Upon feeling the breast, a smooth, rounded, solid, and very hard lump was felt in its upper half, about the size of a cricket ball, but flattened where it lay on the chest wall. The lump could be moved freely on the muscles. A few enlarged axillary glands were felt on both sides, but they were not hard, both the lump and the glands appeared to be slightly tender. Here there were many of the characters of malignancy, but the unusually short history and the presence of tenderness suggested that the condition might be a subacute

mastitis The patient was therefore ordered to wean the child, to keep the breast warm and supported in a sling, and to report again in a week At the second visit the physical characters of the tumour were unchanged, had it been of infective origin, it would have shown signs, either of breaking down or of resolution The take-in house-surgeon was therefore called, and admitted her for a radical operation

To-day such a patient would be treated with penicillin, but the diagnostic difficulty may nevertheless remain A breast abscess sterilized by chemotherapy may persist for months as a firm, painless, residual lump, and the axillary glands may remain enlarged, hard and painless, a constant source of anxiety to patient and practitioner alike

A woman of fifty five came to out patients with the story that a week before she had stumbled in her kitchen, and had struck the left side of her chest violently against the corner of the table When she went to bed that night, she noticed a lump in the left breast This had remained, and she had therefore come up for advice On examination, it was seen that both breasts were of equal size, and the nipples were at the same level, but the lower arc of the left breast was outlined by a semi-circle of discoloured blood pigment On feeling the breast, a hard lump about the size of a walnut, *irregular in outline, and firmly adherent to the skin*, could be felt in its upper half, *lying over the third intercostal space, and about three inches above the nipple* This woman was also told to support the breast with a bandage, and come again In a week the lump was about half its former size In a fortnight it had disappeared, but traces of bruising persisted below the breast for some weeks

Lest it may be thought that alarm was needless in this last case, I should like to mention, for comparison, that of a woman of sixty who gave an almost identical history The findings were similar, except that the lump was in the lower part of the breast, and surrounded by an area of extensive bruising A week later the bruising was less, but the lump remained unchanged, and operation was insisted upon As soon as this old lady had consented to removal of the breast, she told a very different story The lump had been present, *not for a week, but for six months*, and fearing that it was cancer, she had gone to a herbalist, who

had tried to disperse it by prolonged and violent kneading with his hands. Only when the whole area became discoloured had she come for surgical advice, but, fearful of operation and ashamed of her earlier counsellor, she had invented the story of a blow.

A patient may present herself six months after cholecystectomy for gall stones, complaining of attacks of epigastric pain vaguely resembling her former colic. Stones may have been left in the common duct, but the symptoms may equally well be due to duct dysfunction with spasm of the sphincter of Oddi produced by the change from intermittent to continuous secretion of bile consequent on removal of the gall bladder reservoir, to chronic pancreatitis, or to fixation of the pylorus to the gall bladder bed. X rays will seldom show a stone in the duct, cholecystography cannot help when the gall bladder has gone, biochemical tests are unlikely to be decisive at this early stage. Careful observation, symptomatic treatment, and the passage of time will provide the answer in the disappearance of the attacks, or in the appearance of some fresh feature or the emergence of a dominant one that provides a clue.

A middle-aged man may be seen with a history of tenesmus, and on rectal examination a typical carcinoma is felt in the ampulla. In most cases the diagnosis is beyond doubt, and all that remains is to determine the question of operability. If, however, the patient has lived anywhere in the tropical or subtropical belt where he may have contracted amoebiasis the possibility of an amoeboma must be excluded. Many men have amoebiasis without even having had dysentery, or any irregularity of the motions. Many men so affected have no amoebae in their stools. Biopsy is seldom helpful, but a course of emetine will, within a fortnight produce a regression in an amoebic tumour that is decisive.

- 2 *Delay may be advisable to allow us to observe the progress of a lesion, where cure by means other than operation may be hoped for*

Peptic ulcers form an outstanding example of this type of case. Except for perforation or sudden and exsanguinating haemorrhage, no ulcer should be submitted to operation till the patient has undergone a prolonged course of medical treatment,

thoroughly planned and conscientiously followed. It has been established repeatedly by subsequent laparotomy that a gastric or duodenal ulcer, treated medically before it has reached the stage of a fibrous lesion involving all the coats, may heal without leaving a scar visible to the naked eye. Even a larger and more chronic ulcer may heal, and remain healed if the social economic and dietetic factors that caused it can be eliminated. Such a result is infinitely better than that achieved by surgical treatment, good though this may be, for all operations designed to remove the ulcer and its cause imply a profound and permanent recasting of the mechanism of digestion. In dealing with a peptic ulcer which has no features suggesting malignancy, the surgeon should emulate the infinite capacity for postponement of the Arab or the South American peasant.

Another example is provided by a lesion of a peripheral nerve, where there is interruption of conduction without anatomical loss of continuity, for instance, an ulnar paralysis following a blow on the arm. At least four months should elapse before the question of exploration is considered, during which time the arm is kept warm, the paralysed muscles are relaxed and exercised by massage and galvanic stimulation, and the joints of the fingers are moved daily. If, at the end of this time, any sign of recovery has become manifest, these measures should be continued for a further period. If recovery of conduction ensues, not only will an operation be avoided and time be saved, but the final result will be very much better than the partial success which follows resection and suture. The end results of operative repair of the median and ulnar nerves are variable, but complete recovery of epicritic sensibility and of power in the intrinsic muscles of the hand is never obtained.

Ununited fractures often incite the demand for an operation to ensure union, it must be pointed out, however, that this can never be guaranteed to make bones unite that have failed to do so naturally, that it will, if successful, take many months to produce a sound repair, and that, if unsuccessful, it may be the means of preventing a union that would eventually have occurred. It is necessary to distinguish between non union and delayed union. If the fracture line is bounded by dense bone that becomes more clearly defined and more sclerotic as the weeks go by, and

particularly if a joint cavity appears between the ends, non-union can be assumed and an operation can be advised without hesitation, but if the ends, though separated, retain their normal density and texture, the union is merely delayed, and can still progress to consolidation if the fractured site is kept immobilized and the function and circulation of the part are kept active

In patients with arterial disease when gangrene threatens, amputation is seldom required as an emergency measure. Apart from lumbar ganglionectomy, which may postpone amputation indefinitely in those who show a reasonable response to vasomotor tests, Burger's exercises and devices designed to produce passive dilation of the arterioles such as the Pavex boot and intermittent venous congestion, may restore an adequate circulation. The patient will lose a toe that has gone black, but he may take the others with him to his coffin.

Small boys are too often the victims of premature surgery. Phimosis should be treated by circumcision, but phimosis is almost unknown before puberty, and circumcision is practised in our hospitals for reasons of religion, folklore, tradition, apprenticeship, or just plain inability to say no, rather than because it is necessary. Every new born male infant has a long and non-retractile prepuce as a birthright, but he rarely suffers from any obstruction to passing urine or pain in doing so. On the contrary. If the prepuce is amputated, the glans is exposed long before it should be, and troublesome meatitis is a common sequel. If it is left alone, it will stretch and retract as the child grows older, or it may be removed later with little harm. Undescended testes again seldom call for surgery, and never, except when they are the result of infantilism, for hormone therapy. The majority will descend when puberty approaches, as every school doctor knows, those that do not descend are prevented by a mechanical block from doing so, and they must eventually be brought down by operation, but till puberty they are suffering no harm in their abnormal site.

- 3 *In acute infections operation should always be delayed till it is clear that it is inevitable, and usually till localization has occurred*

Nature has been able to deal very successfully with infection for countless ages without surgical help, she does so by walling

off the area of invasion, killing the attackers, and finally evacuating the wreckage of the battlefield. A late operation may hasten her victory, but an early one may ruin her preparations for defence.

The peritoneum, surrounding as it does a territory colonized by countless organisms, has powers of resistance to infection of a high order, it reacts to irritation, chemical or bacterial, by peritonitis, and is able to wall off infection, bring antibodies and phagocytes to the attack, and absorb toxins better than any other part of the body. An operation can deal with the cause of peritonitis by closing a leak or removing an infected organ, or with the results of peritonitis by draining a localized abscess, but it cannot help and may often hinder the peritoneal reaction itself. In the case of chemical irritation that is *not continuing*, as when a small duodenal perforation has sealed off, or of a bacterial invasion that does not arise in an inflamed organ, as in pneumococcal peritonitis, operation should be withheld, but the efforts of the peritoneum may be assisted by carefully planned alimentary rest. The formation later of a localized abscess calls for a limited and local drainage by the most direct and least traumatic route.

In empyemata it is even more important to delay any operation till the infected effusion has been completely walled off from the surrounding pleura. If this process of localization is incomplete, thoracotomy will allow the atmospheric pressure to break down such feeble barriers as have been formed, and convert an infected pleurisy into a complete pyopneumothorax. If an exploring needle withdraws creamy pus, we may safely infer that localization has occurred, and drainage should be carried out. If only turbid fluid is withdrawn, aspiration should be carried out, and repeated at intervals till either the fluid is absorbed or till a change in the character of the exudate indicates that drainage may be safely performed.

Chemotherapy has reduced the indications for operation in the treatment of sepsis. Hilton's maxim, 'where there is pus, let it out' is as sound as it was a hundred years ago, but infection is now often overcome in the pre-purulent stage, and drainage is therefore required less commonly, and later. Infections of the hand, particularly, will very often subside without suppuration if they are recognized early and treated with generous doses of

penicillin combined with immobilization, not merely of the whole hand and arm in a splint, but of the whole patient in bed

The dangers of premature incision, which may hinder the localization of a septic process by opening up fresh planes to the spread of infection, cannot be emphasized too often. A boil on the face should be covered with hot hygroscopic dressings kept in place with a square of strapping that helps to immobilize the area, till its outline has become circumscribed and a yellow spot appears in the centre. A parotitis should be treated by chemotherapy and local heat till the sense of fluctuation or of an elastic spot among the induration indicates that pus has formed. A subdiaphragmatic infection should be watched anxiously by repeated physical, radiographic and cytological examinations till it has become an undoubted subdiaphragmatic abscess, then only can it be drained safely. Premature laceration of the subdiaphragmatic spaces with an exploring needle that finds nothing, may easily convert a resolving infection into a fatal septicaemia

- 4 *Delay is indicated in cases where, though operation is undoubtedly necessary, by waiting the optimum time can be chosen*

The indications for postponing a necessary operation fall into two main groups, those in which in the interval the patient will become or can be made more fit to stand the operation, and those in which the local condition will improve or can be improved so that the operation becomes easier or more satisfactory

Of the cases that are admitted to the Casualty Surgical wards of a General Hospital—burns, compound fractures, lacerations, head injuries, run over accidents, and acute abdominal emergencies of every kind—the majority need an early operation, but none except those suffering from intestinal obstruction or uncontrollable haemorrhage need immediate operation. The majority are suffering from shock, have been vomiting or bleeding, are cold, frightened, and suffering from the effects of the recent catastrophe. They must be undressed, washed, and warmed. Nearly all are better for some form of resuscitation, varying according to their state from sedation, warmth, and sweet drinks, to transfusion. Their illness or injury must be carefully assessed, and the scope and severity of the operation they will require must be determined.

Most of them should be visited by the anaesthetist. A delay of something like four hours will, in the majority of emergencies, allow the surgeon to do a better job on a fitter patient than if he had sent him straight from the reception room to the theatre.

Patients suffering from some constitutional disease should not be subjected to any but urgent operations till their state has been studied and improved. A hallux valgus operation in a diabetic should be left till he has been brought to stable equilibrium with insulin. The repair of a hernia in a bronchitic should wait for summer weather. Many non urgent operations for the correction of defects or blemishes, which are difficult and even dangerous when attempted in the infant, become simple and satisfactory when the patient has attained the equanimity, metabolic stability, and anatomical accessibility of childhood.

Operations for removal or repair require for their satisfactory performance to be carried out through tissues which are at any rate viable, and as far as possible healthy. The processes of repair, whether called forth by injury or by infection, not only obscure anatomical landmarks, but adversely affect the purely mechanical qualities of the tissues. Delay till the local conditions are favourable to operative procedures may be necessary in widely differing conditions.

Acute cholecystitis is seldom a surgical emergency. Operation in the acute phase is not often difficult or dangerous, but the difficulties and dangers it brings are unnecessary because such cases nearly all subside with rest and chemotherapy. While an inflamed gall bladder can be removed easily, display of the duct junctions, identification of abnormalities, and control of the cystic artery, are less easy in oedematous tissues than in a clean field. Chest complications, sepsis, and wound rupture are commoner in the immediate postoperative phase, and stricture of the duct or stones left behind, adhesions, and subdiaphragmatic infections, are seen more often than when the inflammatory reaction has been allowed to subside and the operation has been undertaken some three or four weeks later in a quiet interval.

While there is room for considerable difference of opinion about the general question of removing tuberculous cervical glands surgically, when these have broken down and become caseous, excision is nearly always necessary. The operation may,

however, be one of the most difficult in surgery, far worse than any block dissection of malignant glands. The sterno-mastoid and all the fascial planes are infiltrated, so that there are no lines of natural cleavage, dissection is very largely in the dark, and it is almost impossible to avoid damage to the spinal accessory nerve or even to more important structures. A considerable degree of periadenitis, indicated clinically by fixation of the enlarged glands, is therefore a powerful argument for delay. This matting is very largely due to added septic infection, and not to the tuberculous process. A course of penicillin, aided by sea air or ultra violet light, will usually get rid of the fixation and leave a chain of soft or fibrous glands, freely movable, which can be removed by clean dissection, giving a result satisfactory both from the point of view of cure, and of appearance.

Traumatic aneurysm, a condition rare in civil life, but common enough in military surgery, again calls for delay. Here the disturbance of the tissues is due, not to infection, but to diffused blood. Shortly after the injury, all the structures in the affected part of the limb are stained, distorted, and actively engaged with the process of repair. The injured artery must be exposed among tissues whose vitality is poor, and it is usually necessary to apply the ligature at a considerable distance from the point of injury. The collateral circulation is not yet established, and the venous return hampered by the general engorgement of all tissues. Thus gangrene of the distal part of the limb is very possible. If the part is treated by rest, firm pressure, and cooling applications, the swelling will eventually diminish to a well localized, rounded pulsatile tumour. Ligature of the artery above and below can be carried out with ease, and with the knowledge that no complication need be feared.

In the case of a bone graft, the vitality of the transplanted bone may be adversely affected, not only by sepsis, but by a deficient blood supply in the bed in which it is to lie, by an inadequate or unhealthy covering of skin, or by undue mechanical strain. The actual grafting must, therefore, in some instances, be preceded by months of careful preparation, by the correction of defects, the excision of all scar tissue, and the transplantation of flaps of healthy skin.

There are occasions in surgery when the advantages of delay

are so nicely balanced by its dangers, that entirely opposite lines of action may be advocated by men of equal ability and sincerity. I refer particularly to the controversy about what has been called the delayed treatment of appendicitis. This problem was tersely set down by Hey Groves as 'third day appendicitis,' a label that very aptly picks out its essential features. It is generally accepted that all undoubted cases of acute appendicitis seen during the first forty-eight hours should be operated upon immediately. At the other end of the scale there are many cases in which the symptoms and signs of what has been an acute attack are manifestly subsiding when the patient is first seen, here also it is agreed that nothing should be done at the time and that the appendix should be removed in a quiescent period. Operations of the first and second type have an average mortality of well under 1 per cent.

It is about the treatment of the intermediate cases that opinion is divided, and such cases are usually seen between the third and fifth day of an attack. The time of easy and safe operation, when the disease is limited to the appendix, and when the tissues of the abdominal wall and caecum are healthy, has slipped by, but on the other hand the inflammatory process has by no means subsided, it still has latent powers of extension, and is held in check by barriers whose nature and security are unknown quantities. In such cases the policy of delay, usually associated with the names of two of its earliest and most able supporters, Oschner in America, and Sherren in this country, is advised by many surgeons. I will not recapitulate all the arguments supporting such a policy, but I would point out that it is a line of action, or rather of inaction, which can be carried out only in a hospital, and one which is admittedly dangerous unless the surgeon and his nurses are familiar with all the details of the method and alive to its dangers, and are prepared to operate at the first indication of its failure.

I mistrust and fear the policy of delay in appendicitis. The expectant treatment may lead to resolution in the majority of cases of localized peritonitis and appendix abscess, but when it fails, the patient is faced with the need for an urgent operation carrying a mortality of perhaps 6 per cent. In the majority of localized abscesses I would urge immediate operation. There are, however, cases of appendicitis where the process of infection

proceeds slowly, leading in the course of a week to the formation of a large mass in the right iliac fossa. The symptoms are at no time severe, the temperature and pulse are only slightly raised, and there are no indications of toxæmia. Operation in such cases is extremely difficult: little or no pus is found, but the appendix and caecal wall are enormously thickened, oedematous and friable. The identification and freeing of the appendix is tedious. All tissues tear with the greatest readiness, and bleeding is profuse and controlled with difficulty. The stump of the appendix cannot be satisfactorily invaginated. The postoperative phase is equally unsatisfactory. Convalescence is apt to be marred by recurrent abscesses, secondary hæmorrhage, or the formation of a faecal fistula, which, however, nearly always heals spontaneously. Portal pyæmia is always a danger after an operation of this nature, and, where it does occur, is usually fatal.

If such a condition can be recognized clinically, and it is not always easy, expectant treatment is the wisest policy. When the inflammatory condition has subsided, the removal of the appendix is a simple matter, and convalescence is uneventful. Should such a condition be found at operation, it is advisable to be content with laying a drain down to the inflammatory mass, and to perform appendicectomy when the parts have once more become normal.

In conclusion, I would stress the value and importance, under certain conditions, of delay in diagnosis, or, to make my meaning more clear, delay in applying a label. We must, for the sake of our souls, diagnose every case which we have had the opportunity to examine conscientiously. Such a diagnosis may be provisional, that is, we believe it to be as near the truth as the facts at our disposal will allow, but it must be a definite one in our minds, and not one of many alternatives. It is better to be certain than to be right, for men may rise on stepping stones of their dead diagnoses to higher things, but from the complacent swamp of vague alternatives no ascent is possible. On the other hand a diagnostic label, once applied to a case, is apt to stick to it permanently, to bias all further investigations concerning it, and to govern its treatment.

10 ON SURGICAL DIAGNOSIS¹

(*British Medical Journal*, 1937, Vol 1, p 1)

MANY of the higher examinations in medicine and surgery include a session devoted to the consideration of a single 'long' case, which the student is instructed to discuss on paper under the following headings history, symptoms, signs, diagnosis, differential diagnosis, prognosis, and treatment—seven divisions of which diagnosis is the one central one. From whatever aspect we view the matter diagnosis occupies the dominant position—the keystone of the arch, the summit of the pass. On one side lies investigation, on the other treatment. For the patient, diagnosis is the plateau to which he climbs from the valley of the shadow, plodding behind the guide, following him round what may appear unnecessary bends in the rocky track, deceived from time to time by summits which are not the real one, on the plateau he rests while his guide consults map, studies the weather, and plans the route by which they shall go together down the slopes of treatment. Even more for the doctor is diagnosis a culminating point. It is preceded by the collection of a great number of facts whose mutual relevance may not be apparent, it involves a decision, based on these facts, upon the aetiology and pathological nature of a clinical problem, upon the decision follows action.

Patients often say that doctors are interested in diagnosis only, and those concerned with medical education complain that too much time is spent in attachment of labels and in hair-splitting distinctions between minor subdivisions of processes essentially alike. But while it should never be too much in evidence, diagnosis must remain of cardinal importance in medical training and practice, for it presents the acme of professional skill. On the one hand may lie art and science, on the other rule-of-thumb therapeutics, but in the central point, diagnosis, the doctor is called upon to exercise all his critical faculties, his practical experience, his wisdom born of years of consideration of

¹ Address to the Eastbourne Medical Society

similar problems, his power of clear decision. In diagnosis he is *Homo Sapiens*, not *Homo Quærens* or *Homo Agens*. The two sides of the watershed may call for knowledge, technical skill, and hard work, but wisdom alone will avail him on the summit.

In many highly organized foreign clinics the whole of the processes preliminary and subsequent to diagnosis are handed over to juniors, or at any rate to executive workers. A case is placed provisionally in a general category by some one of intermediate status and then passed along a chain of -ologists and laboratory workers, who pile up a dossier of encyclopædic completeness. When diagnosed it is turned over to the remarkably efficient treatment machine of the institution and dosed or pruned upon lines that have been worked out in detail. But the analysis of the dossier, the interpretation and correlation of all the facts it contains, and the establishment of the diagnosis is the work of the chief or chiefs in consultation. Hence the justification and the need for that vanishing type of wise and learned man whom we call the consultant, as distinct from the specialist. The specialist may thrive on knowledge and skill, without wisdom the consultant is useless. The specialist provides the detailed information. He is the permanent expert, the head of a civil service department, while the consultant is the cabinet minister who, guided and helped by the experts, must decide policy.

Is there anything special about surgical diagnosis? Surgery, broadly defined, is a method of treatment by manual processes. Its territory is very largely on the sunny side of the watershed, with smaller provinces on the summit and beyond. Surgery does not, like medicine, look upon diagnosis as the chief expression of its art, nor, like neurology, as an end in itself, but rather as a means to an end. A correct decision concerning the cause and pathology of a symptom complex is of great importance, but only in so far as it points the way to correct treatment. And decision is more important than correctness, because very often in surgery treatment must be immediate to be effective, and that ultimate solvent of diagnostic difficulties, the lapse of time, is apt to lead to the final court of pathological exactitude—the post mortem room.

The surgeon who is considering a difficult and puzzling case

confronts two separate questions. First, 'What is the probable nature and cause of this trouble?' He must answer this for his own sake and that of his students, and if he answers it definitely, whether that answer be ultimately right or wrong, both he and they will have learned something. Secondly, 'Which of the possible alternatives is the most urgent and the most dangerous, even if it be not the most likely?' His answer to this is of vital importance to the patient, and upon it he must plan his line of action.

The need for immediate action, which in surgery very often means operation, is most apparent in these sudden abdominal upsets which we class provisionally as the acute abdomen. Here the problem before the surgeon is, in its simplest form, 'While the exact diagnosis is by no means clear, and for the present lies between A, B, and C, to what extent is the trouble likely to assume more serious form in the next twenty four hours, is the case one that can be watched at home or as an out patient, or should it be admitted to a hospital or a nursing home?'

The commonest example of such a difficulty is the case of possible acute or subacute appendicitis, one that when we first see it may very well be a true inflammatory lesion in its early stages, or some upset in the mechanical category such as food poisoning or caecal distension due to constipation. I am presuming that doubt still remains after a very careful analysis of the history and a thorough search for physical signs, which will always include a rectal examination. I must apologize for alluding to such a hackneyed subject as the necessity for rectal examination in every case, but it is depressing to find how often this precaution is omitted and how often the omission has serious or even fatal consequences. Inflammation in the pelvic appendix is not appendicitis as the textbooks describe it and the student learns it, there is no right iliac fossa pain, no abdominal tenderness, no muscle guarding. It starts with the initial stages of colic and vomiting, symptoms which it shares with every insult to the viscera, from tinned salmon to strangulated hernia, it passes through the stages from inflammation to abscess guarded from all discovery except by a finger in the rectum, and only betrayed by a general appearance of illness, and it only reappears in the abdomen as a large abscess or a general peritonitis.

The case, then, presents no obvious physical signs. If we make

A problem of far greater difficulty, in my opinion is the distinction between an early intestinal obstruction and other conditions giving rise to colic and vomiting, without localized pain or tenderness, abdominal rigidity, or any alteration in temperature or pulse rate. I will presume that any additional evidence pointing to the likelihood of obstruction such as a tender swelling in a hernial orifice, the scar of a previous operation, or a history of tuberculous peritonitis is absent. In such a case the chief things we have to exclude are intestinal colic due to swallowed irritants, drugs or foods which are infected or inimical to the particular patient, and colic in some other hollow tube in the abdominal cavity, such as the cystic duct or the ureter. These non intestinal colics when encountered in their textbook form can be recognized by the first year student, they may, however, give rise to central abdominal pain, visceral in type but quite unlocalized, and profuse and persistent vomiting, so that even an experienced clinician may fail to appreciate their origin.

The unmistakable features of intestinal obstruction are that the vomiting persists and increases and that constipation is absolute, even to the passage of flatus. In each case there is a loophole for error. The vomiting of an obstruction is first reflex in origin, and later the result of mechanical backflow. This overflow vomiting may not appear for some hours, or even days, if nothing is put into the canal above the obstruction, and if the element of infection (that is, strangulation) is absent or walled off. Constipation is absolute only as regards material passing the site of the obstruction. Any faecal matter, and it may be large in amount, which lies below the obstructed site is voided either spontaneously or in response to an enema, and even a second but smaller evacuation may follow.

Here we are dealing with a condition which is uniformly fatal without operation, and in which operative mortality varies hardly at all with the surgeon's skill, but rather with the condition of the patient and of the intestine above the obstruction at the time of operation. Such cases, therefore, should always be admitted where the pulse rate and appearance of the patient can be under constant observation, the vomit inspected, and enemas given and repeated as required. Three rules have impressed

themselves upon me as the result of long and sometimes unfortunate experience. First, always give the patient plenty to drink—water or some harmless fluid such as lemonade or weak tea, if he is going to vomit the sooner we know the better. Secondly, never decide against obstruction on the result of the first enema, give a second two hours later, and if necessary a third. If every single thing about the progress of the case—the cessation of vomiting and pain, the absence of distension, a feeling of improvement in the patient, and a dropping pulse rate—denies intestinal obstruction, but no faecal matter or flatus is passed per rectum, insist upon operation and stake your reputation upon your decision. Thirdly, if the pulse rate is steadily rising always advise laparotomy, though other features of the case suggest the safety of delay.

This subject is so important that I would cite three personal cases, in one of which I was wrong and unsuccessful, in one wrong but successful, and in the third one right. I have not chosen them as a series to illustrate the increasing wisdom brought by experience, for they came to me in the reverse order. I saw the first case, which is the least creditable to me, a year ago, and the third fifteen years ago.

I was asked to see a lady of sixty five years who had been vomiting almost continuously for eight days. During the whole of this period she had no abdominal pain, no tenderness, and no distension. Her bowels were opened the first day of the attack, but she had passed nothing since, in spite of repeated enemas. She was seen in consultation on the fifth day of the attack by a physician, who was unable to find any abnormal physical sign in her abdomen but discovered that she had a blood urea of 250 mg per 100 c cm. During the whole of the sixth day she did not vomit at all, and a tube passed into her stomach showed it to be empty. On the seventh day she started to vomit again, and her blood urea was now 350 mg per 100 c cm. I saw her the next day.

Though the physician who called me, one of the wisest men in medicine to-day, was in doubt about the diagnosis, I was prepared, with the history of persistent vomiting and negative enemas, to find a case of intestinal obstruction. When, however, I saw the lady who had vomited all these days looking well and feeling free from distress, when I could find no trace of distension

or muscle guarding or of tenderness on abdominal or rectal examination, when I found the pulse and temperature normal and the vomited material quite inoffensive, and when I remembered that during this period she had ceased entirely to vomit for twenty four hours, my conviction was shaken. I suggested that the vomiting might be either toxic in origin or due to a nearly complete pyloric stenosis, and that in any case no operation should be considered till the blood urea had been brought to a lower figure. I therefore instituted a continuous drip saline infusion into a vein in the leg. Two days later I was forced to operate by a rising pulse. I found a large gall stone impacted in the ileum two inches above its lower end, and causing gangrene of the gut throughout its circumference. I removed the stone, resected the gangrenous portion of intestine, and drained the upper loop. The patient died three days later.

I quote this case to illustrate the dangers of too much erudition, of too little common sense. The astonishingly high blood urea was the Lorelei of science, singing the same chant as a series of surgical uraemias following pyloric stenosis which it had been my lot to encounter and treat successfully during the past year, and lulling my surgical conscience with dreams of toxic vomiting. A surgeon who can possibly allow a patient who has passed no faeces or flatus for several days in spite of repeated enemas to remain unoperated deserves a jolt of this nature to put him back on his true course.

I reported my second case in *The Lancet* in 1921. A young man of twenty three years was admitted to Guy's with a typical history of acute intestinal obstruction of three days' duration. The illness started with a sudden agonizing pain following three days of vague abdominal discomfort. From this time onwards he had been in continual but not severe pain. He had vomited such fluids as he had taken and had passed nothing per rectum. Inquiry showed that he had vomited after food only, and that the vomit had never been offensive.

He looked well and comfortable, with a clear complexion and a clean, moist tongue. His temperature was 100°, his pulse 88. The abdomen was slightly full, but moved well, and there were no distended coils or visible peristalsis, vague tenderness was found over a wide area to the left of the umbilicus. On

rectal examination masses of scybala were felt, but there was no tenderness whatsoever and no ballooning. He was given an enema and passed a large formed motion, with flatus. The pain was relieved, and he went to sleep. Next morning he awoke feeling very well, and his pulse was now 68 and his temperature 98.4° . He had no pain, and only slight tenderness. He remained like this for the next two days, taking fluids without vomiting, with a normal temperature and a pulse under 80. His abdomen was, however, more distended, and though he felt comfortable he did not look so well. Operation was therefore advised.

I found moderately distended coils of small intestine and a little free blood stained fluid in the abdomen. On passing my hand downwards I felt a band snap at the pelvic brim, and came upon a mass in the pelvis, which I brought into the wound. It consisted of several coils of intestine matted together and surrounding a loop of lower ileum about five inches long, which was gangrenous and greenish yellow in colour. I resected twelve inches of bowel and performed a lateral anastomosis. Recovery was uneventful, and the patient was discharged well a month later.

I would quote what I wrote as a surgical registrar:

'In this case one had to decide whether to trust one's eyes or one's ears, to explore the abdomen on the history alone in face of the clinical findings, or to trust the latter and mistrust the history. I wrongly chose the latter course. Three things influenced me in this decision: first, that I did not know the patient, and had no confirmation of his story from a medical man, secondly, that the passage of flatus as well as faeces is very unusual in any obstruction other than that of Richter's hernia, thirdly, that the man was a plumber, and since he had very good teeth he might be suffering from lead colic without showing the characteristic blue line on the gums.'

To this comment I would add to-day that, where the history is in any way suggestive of intestinal obstruction, the negative evidence of one enema alone should not be trusted, a second should always be given.

The third case was an old lady of eighty years, who was admitted to Guy's one afternoon with a history of colicky pain referred to the umbilicus, and vomiting, both of which had

started during the morning. Questioned, she thought that an orange she had eaten the previous night had disagreed with her. Her tongue was clean, her abdomen was not distended and not tender, her pulse 72, her appearance that of a feeble individual and a poor operative risk, but in no way toxic. She vomited some bile-stained but odourless fluid. An enema produced a large constipated motion. She was given tea, and put on an hourly pulse chart. She continued to vomit still inoffensive material. A second enema four hours later was returned with a fair amount of faecal material. At 10 p.m. her appearance and that of her abdomen was unchanged, but she was still vomiting and her pulse had risen to 90. Operation was therefore advised. A large mass was felt in the lumen of the lower ileum, squeezed up into healthy bowel, and removed. It proved to be half of a small orange, swallowed unchewed. The hemispherical shape of the *obstructing body* had allowed *intestinal material* to pass along its flat side.

Intestinal obstruction in a baby usually means intussusception. The great majority of these cases are, most fortunately, unmistakable. Difficulty arises when the baby looks too ill for the length of the history, when the characteristic intermissions appear absent, and when no lump can be felt. Here the rule that we must act upon the most dangerous of possible alternatives impels us to admit every case immediately. The possible causes of a similar symptom-complex are Henoch's purpura and acute intestinal infection. With regard to the first, a submucous haemorrhage unaccompanied by a subcutaneous one must be so rare that we have no right to let its possibility influence our judgment at all. The second is unlikely without diarrhoea, and should be considered only if the rectal contents are faecal or tinged with bile. When any doubt remains it is wise to take the baby to the theatre, and there, prepared immediately to operate, to palpate the abdomen under anaesthesia.

But the 'acute abdomen' is not the only example of the doubtful abdomen, there are many less urgent, where the surgeon, after considering all available evidence, is called upon to decide a line of action rather than to attach a label. A line of action is indeed necessary before even a label can be provided for the doubtful abdomen, the type of case in which, after considering

carefully the history and the facts we have obtained by our clinical examination, we are still uncertain whether there is organic disease, and, if so, whether it is a single lesion or a combination of several

A not uncommon illustration of such a difficulty is when we suspect gall stones, duodenal ulcer, and a chronic appendix, one, two, or all three of them. A complete investigation is a lengthy, and for a private patient an expensive business. What we really need to know is whether operation will be required, if so, all subsidiary doubts can be left to be settled by this one certain method. We therefore concentrate upon the gall bladder for, apart from the small body of qualified confidence men who 'dissolve' or 'expel' gall stones, there is a general agreement among doctors that the treatment of stones, once they are giving serious trouble, is operative. Should we start with a barium meal and find an ulcer we must still investigate the gall bladder and appendix. I say this, because I believe, as I am sure do most of you, that the operative treatment of duodenal ulcer, as apart from that of its complications, is as unsound, and should be as dead, as the medical treatment of rebellious gall stones. If we find gall stones we operate, look at the stomach and duodenum and remove the appendix, healthy or unhealthy.

But, in the uncertain chronic abdomen, as in the acute one, it is the appendix that comes first to mind. I do not wish to be led astray from my main theme into an oration on the chronic appendix, a disease responsible more than any other for lazy diagnosis, slipshod pathology, and commercial surgery. The only advice I can give my registrars is never to admit its existence to students or themselves until they are thirty five, and never to take a fee for removing one until they are forty. Being well on the safe side of this line myself I am certain that there is such an entity. I am not considering any case that might be classed as intermittent appendicitis. Where there has been a reasonably clear history of an acute attack in the past, where the attacks are definitely intermittent, lasting about a week and separated by intervals of normal health, where the symptoms are gastric, and appendicular tenderness is first found by the physician and not by the patient, the diagnosis is reasonably clear. But there is also a condition in which attacks of mild pain, limited to the right

iliac fossa, and constantly recurring, without pyrexia or vomiting is due to the appendix. Further, the appendix may, on removal, be indistinguishable from normal, and the diagnosis is confirmed by the therapeutic test alone. After removal of such a harmless looking tube the patients not only lose their symptoms, but they enter a new phase of health, which shows them for the first time that they were not well before. It is a considerable experience of cases of this type occurring among colleagues and personal medical friends, where they and I have discussed all possibilities and decided upon appendicectomy with hope rather than conviction, where the improvement has astounded me and delighted them, that has forced my unwilling acceptance of this dreadfully vague lesion. For I still cannot claim any certain method of distinguishing the true from the false chronic appendix.

Let us presume that we have very carefully excluded all those conditions, failure to recognize which has brought the operation of limited laparotomy into disrepute, partial obstruction of the right ureter from stone or otherwise, inflammatory changes in the right tube or ovary, caecal distension or prolapse, and that the radiologist's examination of the appendix itself has disclosed no abnormality. The patient still complains of pain and we still find tenderness at or below McBurney's point in an area no larger than a penny. Two questions will pass through our minds. 'What harm will I do if this is a chronic appendix, and I leave it alone?' and 'What harm will I do if I remove a perfectly normal appendix?' To the first we must answer 'No great harm.' An appendix of this sort is very unlikely to flare up in an acute attack. On the other hand the symptoms will certainly persist, operation will be required, and until it is done ill health will continue. To the second we must answer, 'No harm, if I operate through a planned and limited incision, unless the patient is a potential neurotic, if, on the other hand, I advise laparotomy, I undertake an operation with a slight but definite mortality, and other possible lesser sequelæ in the way of abdominal insufficiency and adhesions.' To sum up in such a case we must take the greatest care to exclude the potential neurotic, she will certainly have her appendix removed, but, however rich she may be, we should let some one else do it and be plagued by her ever afterwards. With a sensible patient we advise a limited appendicectomy, but need

not urge it unless he is going out of reach of civilization. Laparotomy is not to be encouraged.

This brings me to what is one of the most important matters of policy that a surgeon has to decide. What are the indications, if any, for laparotomy? He will have to consider a purely exploratory operation for a number of different lesions, and first in these doubtful appendix cases. I have just advised you against it.

In the first edition of *Recent Advances in Surgery* I stated, with the dogmatism that is rightly expected from a man ten years younger than I am to day 'Chronic appendicitis is only diagnosed after careful investigation and the weighing of every alternative possibility, and it is only treated by laparotomy.' But what will laparotomy tell us in the type of case we are discussing, one we have investigated thoroughly and pondered at leisure? Through a reasonable incision we can see the organs in the right lower quadrant of the abdomen, all the small intestine and its mesentery, and the pelvic organs. We can feel the whole abdominal cavity, and by this means can immediately recognize stones in the gall-bladder or kidneys, cancer of the stomach or large intestine, enlargement of the liver or spleen, and gastric or duodenal ulcer. But all these lesions are unlikely in the case we are discussing, and should have been excluded by our preliminary investigation. We cannot recognize non-destructive lesions by touch alone—cholecystitis, gastritis, duodenitis, colitis—nor should we attack them surgically if we could. A really large opening will allow us to see everything, but, again referring to this particular class of case, it is very unlikely that by inspection we can establish something that our biochemical and radiological colleagues have been unable to disclose. I am now firmly convinced that the surgical treatment for a chronic appendix is operation through a very limited gridiron incision, which will allow removal of the appendix and one finger palpation of the tubes and ovaries and no more. Such an operation has no mortality and no sequelæ, and involves hardly any loss of time, it is justified, therefore, even as a means of 'diagnosis by elimination'. Though limited, it will tell us all that a wide laparotomy is likely

no place. If the diagnosis is not clear after a barium meal and test meal, then those complications which alone can justify surgery have not yet arisen. Organic stenosis, repeated severe haemorrhage, extension to a size that prohibits permanent healing, early malignant change, can all be established with greater certainty by observation, radiography, and functional tests than by inspection and palpation. Operation is undertaken for treatment and not for diagnosis. Still less is the surgeon justified in advising laparotomy for symptoms suggesting gall bladder trouble, for inspection and palpation can very rarely demonstrate disease which clinical investigation and X-ray have failed to disclose. Lipoid deposits on the mucous membrane and obscure neuro muscular derangements of the mechanism of emptying may give rise to recurring attacks of severe pain, yet leave the shape, density, and concentrating power of the gall bladder, those characteristics which can be examined radiologically, unchanged, and its appearance and texture apparently normal. We must decide upon the history and results of our investigation, which will often include a prolonged period of observation and a therapeutic trial of 'medical drainage,' whether the symptoms arise in the gall bladder. If we have so decided, we operate to remove the gall bladder, and no apparent normality of its surface or texture can affect that decision.

When the possibility of carcinoma lies among the alternatives we are turning over in our minds, the question 'Am I likely to do more harm by delay or by laparotomy?' assumes a very different complexion. We are often told that the most sinister fact about cancer is its complete silence during the early stages, giving the victim no indication that anything is amiss till the disease is far advanced. We are frequently assured that neoplasms, at any rate when they affect the stomach and colon, can be recognized by clinical, biochemical, and radiological investigation, provided that the patient has symptoms and presents himself for examination. Yet it is a distressing fact that we as surgeons are often asked to operate on patients who have been suspected for some time of having cancer, who have been X-rayed and investigated repeatedly with negative results, and who have finally, somewhat grudgingly, been advised a laparotomy which discloses a growth too late for resection. It is an aphorism in yacht racing

that the man who does not cross the line before the gun *one race* in seven, is never going to get a good start. In cancer surgery the man who does not do one unnecessary laparotomy in *seven* is going to lose many lives through timidity. When we find a man over fifty, who has hitherto been healthy, starting to lose weight and strength progressively, even though he has no pain, indigestion, or constipation, even though every test is negative, we must still feel that carcinoma is only too likely. I would always accept the positive warning of a penny weighing machine in preference to the negative assurance of a ten guinea expert. If the weighing machine persists in this opinion after six weeks, during which the patient has been relieved of work and worries, kept strictly at rest, and carefully dieted, we must advise laparotomy and urge it with all the persuasive powers at our command. The evidence of eye and hand is the only final court of appeal. A sensible patient will readily fall in with this advice when it is put to him, and if the result is negative he will be so delighted to receive a *clean bill of health* that he will think *nothing of his suffering or even of our fee*.

Exploratory laparotomy, then, is a course which we will never advise lightheartedly, and only when we are certain that it is a lesser evil than delay. To-day the mortality of such an operation has been *practically abolished, thanks to improvements in* anaesthesia and preoperative and postoperative treatment, and adhesions to the scar have been rendered less likely by methods of suture which leave no raw surface on its abdominal aspect. Even so the risk cannot be less than one in five hundred, or the incidence of adhesions *less than one in fifty*.

I have thus far chosen the illustrations to my thesis, the lamentably simple one that in surgery decision is often the better part of diagnosis, from the abdomen. This has been almost inevitable because so many of the structures in this dark cavity are liable to catastrophes that progress with *startling rapidity from* their silent onset to their fatal termination, because their topography is not constant, as in the rest of the body, but to a certain extent fluid, because their troubles are only vaguely recognized by their owner, and then referred by him to their embryological rather than their present site, and because they are *entirely hidden* from our eyes and very effectively screened from our hands. But

exactly the same need for precocious decision is constantly arising in other parts of the body

A clinical puzzle that we encounter all too frequently is the subacute arthritis of childhood, the joint that may possibly be tuberculous. The onset of tuberculous arthritis is, as you all know, remarkably quiet. Pain, beloved of the textbook, is rarely a prominent and never an early symptom, it appears only when destruction of the joint is already far advanced. So symptomless is the onset, bringing nothing more obvious even to a solicitous parent than a disinclination to play, that we rarely see an early case. The children are brought to us with marked wasting, limitation of movement, and destruction of bone that is visible in the X ray picture and has often produced a measurable deformity. When the diagnosis of tuberculosis can be made with certainty the time for cure is long since past, the only tuberculous joints that are cured—that is, restored to complete normality—are those in which the diagnosis is uncertain. What, then, is to be our attitude? If, on the one hand, we decide to regard every doubtful case as tuberculous we must enforce a minimum period of two years' immobilization, protection, or restricted activity—a most drastic treatment for a case that is not tuberculous. Let me give a definite example from my own recent experience.

I was asked to see a little boy of five because he had been limping slightly for about six weeks. I found a fair haired, rosy-checked youngster who looked the picture of health. At first he would not limp, but as he played about the room I noticed that he tended to spare the right leg as he pranced around. I will not give the results of my examination in detail but will tell you that the first and most important of the methods at our disposal, inspection, gave me the only indication of abnormality that I was able to find. I could see a little thickening of the tissues in the right knee joint, apparent only in a blurring of the outline of the patella and patellar tendon when compared with the other side. When I felt the knees I was unable to appreciate any difference, to detect any fluid or synovial thickening. The measurement of both thighs and calves was equal, the movements of the hips, knees, and ankles the same. An X ray photograph taken next day showed no abnormality, no difference between the bones of the two limbs. The child had had no previous

ailments of any kind, he lived in one of London's newest and healthiest suburbs and spent most of the day in a large garden; he slept and ate well. On the other hand one parent had a strong tuberculous history.

The diagnosis in such a case would be no more than a matter of *amour propre* for the doctor did it not imply decisions upon treatment affecting in any case the next year or two of the child's life, and possibly his whole future. Children at the age of five are very prone to a non specific arthritis, whose origin and causative organism is unknown. One of my colleagues held sufficiently strong views on the first question to class this group as 'tonsil joints', while many would attribute them to a mild streptococcal infection. To immobilize a tonsil joint for two years would be a calamity only exceeded by that of allowing a tuberculous one to run about till a definite bone focus had become apparent. The one certain diagnostic test, arthrotomy and removal of a piece of synovial membrane for section, is fraught with far too many dangers should the condition be tuberculous to allow it to be considered.

The only decision possible to us is that we must regard every chronic or subacute arthritis appearing in a child between the ages of three and twelve as tuberculous until we have proved the contrary, and we can prove this only by a period of diagnostic rest. Complete immobilization, by splint or plaster of paris, has no distinctive value, for it will cause any inflamed joint, tuberculous or otherwise, to settle down, and when it has settled we are in an even worse position, still doubtful whether we can risk activity with the chance of reactivating a tuberculous process, and with no physical signs to guide us or to support our cautious attitude before the parent. Mere rest in bed, on the other hand, will clear up a 'tonsil joint' in six to eight weeks, but will do no more than keep a tuberculous one stationary. If at the end of this period we still find the joint swollen, with limited movements, we can proceed to a period of rigorous immobilization with the certain knowledge that it is necessary and the comforting reassurance that it is in time.

Yet another instance where diagnosis is a matter of faith but decision of vital importance is provided by the indefinite troubles of the breast in women of over forty. Here, as in similar troubles

in the abdomen of men a decade older, the first question to be faced and answered is that of possible malignancy. But, whereas in the abdomen we can, when doubt remains after prolonged consideration, decide to look and see, leaving things as before if cancer is excluded, in the breast we can only remove and see, and by thus I mean remove the whole breast. When a woman has passed the age of forty she has passed the time when any local operation on the breast is safe. I say this because one lesson which we can apply to our daily task appears to emerge from the large amount of pathological research which has been done within the last decade, that changes which occur in the female breast after the peak of the child bearing period, be they degenerative or malignant, are prone to occur simultaneously in many parts of it, and any such change sufficiently advanced to be appreciated by our senses is not an isolated lesion but a sample of what the rest of the breast holds in a less obvious form. These breasts often contain lumps that have no single physical sign suggesting cancer. The commonest form for the lumps to take is that of irregular nodules of rubbery consistency scattered throughout the breast substance, linked up to each other by intervening strands and impalpable with the flat of the hand. For these lumps I should prefer to retain the name of chronic mastitis till pathologists have ceased to differ among themselves about the aetiology and pathological nature of the different types and have agreed to hand out a classification which we may accept and teach our students. Chronic mastitis does not call for surgery, or even for alarm, but merely for caution. I do not suggest that any woman with such a breast can, in fairness, be advised to forget about it, she can be told not to worry about it, but requested in a reassuring way to come for an overhaul every few months. Chronic mastitis is so common that its relation to cancer can never be assessed numerically, but there is no doubt that a breast in which the epithelial structures are pressed upon, their nutrition impaired, and their lymphatic drainage obstructed by an increase in the interstitial fibrous tissue will be more liable than a normal one to develop malignant changes. Patients, however, rarely ask for advice about such a breast, but come because a single lump has recently attracted their attention, is growing, or has become painful. If such a lump has any single character of malignancy

we must neglect all signs pointing the other way and treat it as cancer. By my qualifying introduction, however, I am suggesting that it differs from all other lumps we may find in the breast only in being palpable with the flat of the hand, it is not hard, nor is the shape, contour, or mobility of the breast in any way different from that of its fellow. Such a lump is almost certainly a cyst. The patient wants us to remove it. To agree will be easier for her, and for ourselves, for it relieves her fears and establishes our position as men of decision. You must be familiar with the patter of the lump remover.

'I feel certain, my dear Mrs. Smith, that there is no need to worry in your case, but I know that your anxiety comes from a knowledge that many lumps in the breast of women of your age, harmless at first, undergo changes of the most serious nature. I would far rather see a patient sufficiently alive to these possibilities to be unnecessarily afraid than one who remains complacent till the chances of cure are long past. But while I feel convinced that this lump of yours is innocent in nature you will realize that that is no more than my opinion, for what it is worth, and that the only final answer is that given by the microscope. I should, therefore, strongly advise you to submit immediately to a small operation for its removal, an operation without risk, that can, if you wish it, be done under local anaesthesia. In this way alone will it be possible to get an unequivocal verdict and set your mind, as well as my own, at rest.'

The summing up is excellent, the judgment wretched. The lump that we feel is one of a countless host scattered throughout the breast, differing from the others only in being distended to a greater extent with fluid, but not, therefore, any more or less likely to show early malignant changes. To remove it is neither treatment nor diagnosis, nor is it even decision. It is akin to the policy of the president of a South American Republic who would seek to scotch a revolution by shooting the fattest of his opponents. The lump is either precancerous, or it is not precancerous. If it is, the whole breast should be removed, if it is not, its excision is not only unnecessary but gives a false sense of security which will often cause the subsequent appearance of malignant change to be ignored till too late. A similar problem is presented to us by discharge, serous or blood stained, from the nipple. Such a

discharge may be due to chronic mastitis, to duct papilloma, or to duct carcinoma. If there is a lump in the lobe drained by the discharging duct we cannot say that it is papillomatous or malignant till the signs of wider involvement appear, if there is no lump any diagnosis is no more than a guess. But discharge from a duct means irritation in an epithelial lined tube, *irritation* leads to proliferation, and proliferation in time assumes the characters of unrestrained growth. Discharge from the nipple calls for decision rather than diagnosis, and that decision must be between further observation and excision of the whole breast and its fascia.

I realize that my views about the doubtful breast are drastic, but if they are right they must be accepted. Two considerations may make their acceptance easier. First, when we come to deal with the treatment of cancer we discuss various alternatives—radical surgery of different types, *irradiation in one of its many forms*, or a combination of the two methods—in an attempt to find that plan which carries the greatest chance of cure. But we know that in the long run our successes will seldom be more than 60 per cent, and we can never be certain that we shall succeed with any particular patient, however localized the disease may appear to be. With precancerous conditions, on the other hand, we can, by a much more limited removal, guarantee success in 100 per cent carried to any number of decimals. Returning to my simile of the revolution—and no comparison could better fit cancer where one group of cells combines to attack the corporate body, with the probability that both whole and part will be involved in the eventual ruin—we may compare the usual method employed to deal with such uprisings—to attack the insurgents after revolution has broken out—with the much more scientific prophylactic method evolved in Russia, that of *exterminating* (*liquidating* is the correct political euphemism) the whole social stratum in which discontent might arise before the first hint of trouble. This method, after all, is the only safe one, it has meant the slaughter in cold blood of several million innocent people, but it has made Russia safe for communism.

The second consideration is that the operation which is adequate to deal with a precancerous breast is limited, slightly, and far less severe and dangerous than that which will be required

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when cancer has appeared. It involves the removal of all breast tissue, of the pectoralis fascia in which the main lymphatic channels lie, and preferably of the anterior axillary glands in addition, but not of the muscles or of any more skin than is necessary to fashion flaps that will clothe the chest without redundancy when the breast has been removed. It can be accomplished through a low curved incision placed horizontally, and will leave a scar that is invisible even in the best night clubs or on the most fashionable beaches. We are, however, treating the patient rather than the disease, and we may be forced to local removal of a lump if we realize that she will otherwise fly to some quack remedy. But the ordinary sensible woman will accept the reasonableness of our advice and be content to report for examination at regular intervals, content in the knowledge that we shall recommend more drastic measures only when they are necessary. Should we see any sign, such as unilateral alteration in the shape of the breast, or of the orientation or level of the nipple, we must give this advice even though the lump itself remains unchanged.

I have tried to suggest a point of view rather than to lay down rules, as indeed it would be most unfitting for me to do. To us our profession is more than a trade, it is our life, an expression of our humanity. That humanity has three aspects—science, art, religion, we know, we feel, we believe. But the third, which is perhaps the most important of all, which underlies the others, is least often acknowledged. Many writers speak of the science and art of medicine, but none since Sir Thomas Browne has written of the religion of medicine. The three are necessary to a sane and balanced whole, for just as science and religion without art produce the fanatic, art and religion without science the mystic, so science and art unleavened by faith produce the virtuoso, the technical expert. The faith of medicine is expressed in the Hippocratic oath. "The course I adopt shall be for the benefit of my patients, according to my ability and judgment." The welfare of the patient is the end we seek in surgical decision, which thus becomes the surgeon's religion, a faith that must sometimes repudiate science and transcend diagnosis.

11 MISLEADING LEADING ~~SYMPTOMS~~¹

I HAVE been asked to open a discussion on misleading leading symptoms, but it is so long since I have been able to attend one of these dinners, that I cannot remember what functions, if any, are served by the opener. I take it, however, that he is in a similar position to the actress who kicks off at a charity football match. She need not kick the ball very hard or very far, and it is entirely unimportant in what direction she kicks it, she serves her purpose as she sets it in motion, and there are a number of hefty partisans only too anxious to rush in and propel it with great speed and extreme vigour in opposite directions. I will therefore try to follow this lady's lead as far as I can without beauty or acting ability.

What is a symptom, what is a leading symptom, and what is a misleading leading symptom? A symptom is something complained of by the patient, a leading symptom is the dominant one of the picture, but a misleading symptom is misleading only to one able to be misled. Yet the word mislead does convey the impression of motion, and he who is stationary cannot be misled. In this sense surgeons are more likely to be misled than physicians, for they are more likely to do something. The policy of masterly inactivity sufficiently persisted in, is an infallible guard against misduction.

A taxi driver came to hospital complaining of a corn. The porter sent him to the surgeon. The surgeon used him as a text for the well worn homily that if you let the patient tell his story in his own time and in his own way, you will get the truth. The patient related how six weeks ago he first felt a soreness under the sole of his left foot that worried him only at the end of a long drive, but each day the pain got worse, particularly towards evening, till latterly he could hardly put out the clutch without an agonizing throb, and he longed for the time when he could hobble home and drop into bed. The surgeon congratulated him on the admirable way in which he had told his story, pointed out to the class that such a sequence was typical of a plantar wart.

¹ Opening remarks at a dinner discussion of the Hunterian Society

the pain of gall stone colic, and coming a little behind this is the pain of renal colic, still further that of acute pancreatitis, and a long way behind that of appendicitis or intestinal obstruction. Experience alone will engrave the quality of these pains in our minds. When I hear a surgeon speaking of the excruciating agony of acute pancreatitis, I suspect him of being too young to have seen many acute emergencies, or too eminent to attend this most unprofitable type of case. But, in assessing the severity of any pain we must also assess the personality of the sufferer, and apply the necessary corrective factors before we bring it to the scale. A phlegmatic individual will not feel and a brave one will minimize a severe pain, a highly strung or cowardly one will exaggerate it, and a dishonest one will invent it, and by practice or study may give a description accurate enough to mislead the expert. There is an Australian seaman of twenty four, who was last heard of in Staines hospital, who may be called a professional perforator. He can describe the sudden agony with such vivid imagery, look so ill, and hold his muscles so rigid, that he has been opened fourteen times already in various hospitals in different parts of the world. It is only when his story is carefully investigated that it appears that though the greater part of his time is spent at sea, he has never perforated on board ship or in a small harbour without a hospital.

This man was possibly mentally abnormal rather than dishonest, for the suggestion of an operation usually unmasks the humbug. When I was Registrar at Guy's, I was called up in the night to see a pale young man with a twelve hour history of colicky pain settling down in the right iliac fossa, vomiting, and constipation. He winced when I pressed at McBurney's point, and when I did a rectal examination, seemed to dislike pressure on the right side of the pelvis more than elsewhere. Though he had a normal temperature and pulse I made out a form for his admission, and went up to supper. There I met him again eating sausages with the dresser who had coached him so successfully, and who now introduced to me a well known actor.

Spurious pains are all the more difficult to interpret when they are accompanied by a genuine lesion. Six months ago I was asked to see a lady of seventy with a duodenal ulcer. She had a history of several years of indigestion, and for the last year she

had been under the constant care of a first class general practitioner and the frequent observation of the very careful physician who brought her to me. She was tender over the duodenum, and in the X-rays a deformity of the cap was present both symptoms and radiological changes were resistant to treatment. The patient was one of those frail, gentle, pink and white old ladies, all lavender and lace, who are apt to live surrounded with service and adoration. We hesitated to inflict pain on such a charming creature, but operation seemed inevitable. I found a duodenal ulcer, whose appearance suggested it had been healed since Queen Victoria's Jubilee, and did a Finney pyloroplasty. But from that day our patient came out in a new light. She had loving sisters and a doting husband, but their adoration and devotion were nothing compared to her own care for herself. She found fault with every one and everything in the home, she could not eat in the daytime or sleep at night, for weeks she was too feeble to get up, and for many more weeks too tired to leave the home. Having left she has never ceased to worry her doctor and me. She still has her pain after food, and now also has a tender spot in the scar itself, and all she has gained by the operation is one extra person, myself, to plague, and one extra thorn to her martyr's crown.

It is very easy to be misled by these duodenal ulcers of the mind, very difficult to remember that often we must decide not only what the patient has got, but what the patient is suffering from. And I cannot feel any real confidence that the trend of medical education is making these mistakes less likely in the future. The man who by prolonged study and apprenticeship has acquired a knowledge of disease and of the reactions of human nature in the presence of disease, who has learned not alone the pathological anatomy, symptoms, and signs of common conditions, but which to expect in patients of either sex, of certain ages, or of some particular appearance and bodily habit, who knows that excessive tenderness is often as much an indication of nothing the matter as is no tenderness, such a man will seldom be misled. But we are tending to produce specialists, and the man who is always thinking of one organ or one ailment is going to recognize the smallest abnormality to that organ, the slightest manifestation of that ailment, while swallowing the camel of

some greater general derangement. And it is to these one-track men that the sick are being sent by the advice bureaux of the Mayfair tea rooms. The rather nervous girl with a Burne Jones neck has very little chance of escaping thyroidectomy. Her friend, with a pain in the back, is not even allowed time to patch up the quarrel with her boy friend that is its true aetiology, but, according to the bell she rings, she is put in a plaster jacket, has her spine manipulated, is given a vaccine, has her teeth extracted, is short waved or ultra violated, has a ventro-fixation, a presacral neurectomy, or is given a course of oestrin. A study of the plates in Harley Street leads to the sad reflection that Ali Baba had a relatively simple task.

But pain is not the only symptom that may mislead. Vomiting, abdominal distension, and constipation in an old person usually mean obstruction from cancer of the colon, but the same picture is given by uraemia. I have several times been asked to see such patients, but I do not remember one that was not also drowsy enough to suggest the true pathology. Haematemesis should mean organic disease, but the vomiting of large quantities of blood is a well known manifestation of hysteria or malingering, and it may be impossible to prove the deception. I once had such a patient, who repeatedly vomited a chamber full of blood, yet never had a radiological deformity or suffered any drop in her colour index. The bleeding only ceased when her husband was killed in an aeroplane crash. I myself have been led astray by the hoary pitfall of jaundice. A lady was sent home from India, wasted to a skeleton, deeply pigmented, with a large hard liver. To my great relief I found, on opening her, that her obstruction was due not to cancer, but to a large egg shaped stone in the common duct. After its removal she improved rapidly, but did not regain her colour with the speed I should have liked, and it was not till many weeks had elapsed that I realized that the remaining pigmentation was racial and not icteric.

I do not wish to multiply instances of error, but I would return to my original thesis, that a symptom is misleading in proportion as we make it a leading one. Symptoms should come before us to be put in their place, and when all are marshalled, assessed and allotted to their relative stations, the place of the most clamant is not necessarily that of leader.

I would put in a plea for two things. First, that we should not lightly sacrifice any of our heritage of clinical teaching. Having now visited the hospitals of many countries, I firmly believe that we have in our own the system best adapted to produce that highest manifestation of *homo sapiens*, the good doctor, not necessarily the brilliant scientist, the skilful surgeon, the erudite physician, but the good doctor, the man to whom the patient can turn in the certain knowledge that his problems will be considered with wisdom as well as learning. It is difficult to realize that the art of clinical medicine is comparatively new, and is still hardly known in many parts of the world. Sydenham brought medicine to the bedside, and laid the foundations of that personal study of the case which is the glory of British medicine. If we keep to this tradition, we shall avoid the worst errors of an outlook that is limited to the laboratory and the lecture room.

And secondly, I would plead, as one who has suffered profoundly from a complete ignorance of psychology, that this subject should, in the future, be given a much more important place in the curriculum. We want no more amateur psychiatrists, but we do want our future doctors taught something about the working of the normal mind as a part of their physiological training, and more than a smattering of the way the normal mind reacts to the stress of circumstance and the onslaught of disease, and how in turn it will mould the clinical picture of that disease as it is presented before us in symptoms.

12 THE EARLY DIAGNOSIS OF CANCER OF THE OESOPHAGUS AND THE STOMACH¹

(*British Medical Journal*, 1947, Vol 11, p 405)

WE know the main facts about cancer. We know it is the chief cause of death in men and women in the years after forty—the time when they have established a place in life, a home, a reputation, when they are most useful to their profession and their country and most necessary to their families. We know that, at first, it is not a tumour but an insensible transformation of the cells in some part of the body to a structure that is a caricature of the normal rather than something new or different, that this new tissue has no nerve supply, and that it produces no inflammatory reaction in the normal parts surrounding it—in other words, that it is entirely painless, and in most cases entirely symptomless. We know that, for purposes of recording, cancers can be sorted into three stages, based on their gross naked-eye pathology. Stage I, in which there is a local growth only, Stage II, in which as well as the local growth there are early metastases in the nearest lymphatic glands or in tissues immediately adjacent, and Stage III, in which the primary growth or the metastases are fixed, or more distant organs are involved. We know also that in those parts of the body which can be effectively irradiated, or where a radical operation that satisfies pathological criteria can be performed—the breast, the colon, the rectum, and most parts of the skin—the five-year cures in Stage I are 80 to 90 per cent, in Stage II about 50 per cent, and in Stage III not more than 10 per cent.

Radiation will improve, but it is doubtful whether that improvement will be dramatic. Radical surgery can hardly get more radical, for the limitations now set are not the result of timidity or lack of enterprise, but are rather due to Charles Mayo's stipulation that among the results of successful surgery should be a live patient. If, therefore, we are to get more cures it can only be by finding more patients in Stage I, the stage of silence.

Two of the most malignant of all growths are those of the

¹ Substance of lecture delivered at Mount Vernon in 1946

oesophagus and the stomach. Cure of oesophageal cancer is almost unknown. Cure of gastric cancer is sometimes seen, but in not more than 5 per cent of these cases that come to a surgical clinic, yet it is the commonest of all malignant growths, and the chief cause of cancer deaths in all civilized countries in which records are kept. There are no signs or symptoms by which we can diagnose these diseases in their early stages, but are there any which should raise our suspicions and allow us to start those investigations that will give the answer in time? It is those early signs that are the hardest to discover, and many of you may have observed some warning sign that the rest of us have not noticed. If you have I hope that you will share it.

Those who were in the first world war will remember the 'stand to' in the front trenches an hour before dawn, the hour when mists and half shadows conceal familiar objects, the hour when the enemy may creep unseen, when a suspicious alertness is the only way to safety. We should all 'stand to' over our patients who have passed the forty mark, suspicious of the enemy who may even then have established a footing unknown. We should beware of the man who starts to look ill, to get a little paler, to lose weight, to turn down the second round of golf, or the last rubber at bridge, to miss his second helpings, and to become 'choosy' about his diet. The mind or body of a healthy man does not tire suddenly and perceptibly before he forty or four score, and the change from the 'Wimbledon Tiger' to the steady back line six set tournament player of forty years later is imperceptible. Habits of meals and bowels do not change without reason, but it is the neurotics who look at their faces and tongues daily in the mirror and weigh themselves weekly, and with normal men we have to rely on our own observations or the reports of their wives and friends. We may first suspect loss of weight in our friends by the loose collar, the baggy waistcoat, loss of strength, by the tendency to take a taxi instead of a walk, the lift instead of the stairs. These things we can check by a few questions. Have they noticed any difference in the fit of their clothes? Can they do all the things they did six months ago? Is there any alteration in their appetite, the amount they can eat at a time, their bowel habit? Have they started to suffer from wind lately? Some men are windbags all their lives, but a previously unexceptionable

member of society who starts suddenly to belch or rumble probably has cancer. Have they for the first time taken to powders or medicine?

To start with we keep our suspicions to ourselves, for we do not wish to earn a name for being alarmists or to involve our patients in needless expensive investigations, but we must keep a constant watch on the deviation we have noticed, and we should start a weight chart. There are many groups of disease, and each has its general characteristics. The colics from stone come like stabs across the sky of otherwise excellent health. The infections are incidents of varying duration with a rise and fall. Cancer is progressive, the paleness increases, the tiredness gets worse, the weight continues to fall. And there are certain tests we can carry out without revealing our suspicions. If we suspect carcinoma of the oesophagus we can order a bulky cachet of 'medinal' and aspirin and stand by while they swallow it, if carcinoma of the stomach we can ask them to share a bulky meal. And we can put them on a meat free diet and have a stool examined for blood, a negative result makes a cancer anywhere in the alimentary tract very unlikely. But if symptoms continue and progress, if we see that slight but steady deterioration that whispers 'cancer' to the trained eye, we must insist upon a complete investigation. We may be wrong, but if we always wait till we are right we shall always be just too late. A live mistake is better than a dead certainty.

Cancer of the oesophagus is predominantly a disease of men, and of old men—that is, sixty and over. It is hardly ever diagnosed till it is well advanced, for it is entirely silent. The mouth and the stomach form their opinions about food and reject what they do not like. The oesophagus is insensible and uncomplaining. A carcinoma usually produces no recognizable obstruction till it has completely encircled the lumen while even one centimetre of normal wall remains swallowing usually appears to be normal. Once the growth completely encircles the gullet dysphagia appears and progresses rapidly, first for solids, then for soft foods, then for liquids. Late signs, palsy of the left recurrent laryngeal nerve, involvement of the trachea or bronchus, glands in the neck, Horner's syndrome, follow in turn.

There are no early symptoms, apart from the vague ones I have outlined, and questions to all my friends have produced only three observations with any bearing on the subject. First, that there is occasionally some oesophagitis above a non-obstructive growth, giving a burning feeling deep in the throat 'as if they have swallowed some very hot tea'. Secondly, that a partial obstruction may suddenly be complete to some usually large bolus, so that patients come with a story of a 'bone stuck in the throat'. Both stories call for X ray examination and oesophagoscopy. Thirdly, that the early dysphagia of a slightly stenosed growth is often reported as 'indigestion,' which leads to investigations by a barium meal and a report of a normal stomach that allays suspicion until too late. It should be the rule at every barium meal that the first swallows are watched in their passage down the oesophagus. One swallow may not make a summer, but it may diagnose carcinoma of oesophagus or cardia while there is hope.

Cancer of the stomach is also a disease of men, but it occurs much earlier, many coming soon after forty, and not a few in the thirties. The classical symptoms are epigastric pain unrelieved by alkalis, vomiting, anorexia, anaemia, loss of weight. About half the cases we see give this picture, but they are already far advanced. Very many are entirely silent till their terminal stages.

A celebrated American gastric radiologist swallowed a cup of barium to try out a newly installed apparatus, the film, to the horror of the radiographer who developed it, showed a large gastric carcinoma. Within the last five years two very famous surgeons have suddenly discovered that they had a carcinoma of the stomach by feeling the mass bump against the operating table. So silent is the lesion in the stomach that growths often reveal themselves by syndromes that do not seem to be gastric. Lesions near the cardiac orifice cause symptoms closely resembling those of oesophageal obstruction. A barium swallow may appear to pass normally down the oesophagus, and if it is not followed by a *barium meal* a growth in the stomach may be missed. Growths near the fundus are very difficult to demonstrate radiologically, and unless the fundus is examined with the patient in the Trendelenburg position, so that the barium fills the whole cardiac region, small irregularities cannot be seen, and even large ones

may pass unnoticed. In many cases the barium is held up at the lower end of the oesophagus, but as the constriction is smooth and funnel shaped a diagnosis of cardiospasm is made. This is one of the commonest mistakes in gastro-intestinal radiology, and one of the most tragic, for while the patient is being treated with bougies, or, as happens not infrequently, running the whole bewildering gamut of psychological investigation, the growth below the diaphragm is passing insidiously from the operable to the inoperable stage. Cardiospasm is usually a disease of younger people, and by the time it has progressed enough to bring the patient up for examination has a long history of periodic bouts of dysphagia and of remissions. In cardiospasm, the oesophagus is seen in the radiograph to be considerable dilated, at least to the size of a normal caecum, above a growth the oesophagus may be filled to capacity, but it is rarely dilated in the true sense, and it does not exceed a candle in diameter. A diagnosis of cardiospasm should never be made in an adult with a short history till the possibility of a high gastric cancer has been excluded.

In other cases profound anaemia is the only recognizable symptom, and the diagnosis of pernicious anaemia is made. In yet others a small and silent growth sends out showers of malignant cells into the peritoneal cavity that seed themselves in the pelvis, giving rise to a pelvic shelf and rectal obstruction or, in the female, to bilateral implantation carcinoma of the ovary.

Early diagnosis, once more, is the reward of a suspicious mind. Does a man who has eaten like a horse till the age of forty suddenly get indigestion, though his job, his habits, and his wife remain the same? No! Does gastric ulcer start after forty? Never—well, hardly ever! Does the tired business man come back tired after a week at Westward Ho? Not if his tiredness is no more than business worries. These people want investigation before, not after, they start a course of diet and medication on the advice of the chemist, the man in the train, or the writer of the health column in the evening paper. 'The seller of alkalis is the undertaker's best friend'. Investigation means observing these doubtful cases closely and anxiously, inquiring about appetite and comfort at meals, whether they have a sense of fullness when the meal is half done or belch foul smelling gas—two symptoms highly suggestive of carcinoma, it means weighing them weekly,

examining their blood and their stools, testing their vomit for free hydrochloric acid and blood; if suspicion continues it means a barium meal, and if the barium meal is inconclusive, it means gastroscopy. The gastroscopist has to look at a great many stomachs before he knows his job, but when he does he misses very few carcinomas of the stomach.

One of the most important services that gastroscopy can perform is to decide whether a particular ulcer is innocent or malignant. There has been much controversy about the relationship between gastric ulcer and gastric cancer, but it is undoubtedly one of the most important aspects of the question that concerns us to-day, the early diagnosis of malignant disease of the stomach. We must consider two things; the gastric ulcer that undergoes malignant degeneration, and the gastric cancer that resembles gastric ulcer.

Authorities vary greatly in their estimate of the number of ulcers that have become malignant. On the pathological side, from the investigation of necropsy and operation specimens, estimates vary between the 4 or 5 per cent of most British pathologists and the 50 per cent of McCartney of the Mayo Clinic. Surgeons for the most part accept the lower figure, but Maingot in a recent article has stated that in about 10 per cent of the cases of cancer of the stomach that come to him the change has been implanted on a previous gastric ulcer.

I personally believe that the number is very low indeed—so low that I should never use the argument of impending malignancy to bully a patient with an ulcer that had all the clinical indications of innocence into an operation she did not want to have. No surgeon in a lifetime has enough personal cases to allow him to lay down the law, but I must place on record that in twenty years of gastric surgery I have never seen a gastric ulcer become malignant.

Cancer mimicking ulcer, on the other hand, is seen by every surgeon several times a year. It is necessary to remind ourselves that cancer of the stomach, while it is usually a very rapid disease, may be as slow as a scirrhus tumour of the breast, going on for ten years with little change; that patients with slowly progressing cancers may have a good appetite and free hydrochloric acid, and that they may lose their symptoms for a time and put on

weight on a gastric diet. These slow cancers are digested in their central necrotic parts by the gastric juices, and, whether at operation or necropsy, may have very much the appearance of an indurated peptic ulcer. But in these cases, if we go into the history carefully, we find that the gastric symptoms have started suspiciously late in life, that though they may have gone for some years they have been steadily and slowly progressive and that the remissions have not been periods of complete health but of lessened discomfort. The true ulcer usually starts in the twenties, and, in its long history before its final cure by medicine or surgery, has many 'remissions of months' or years' duration. I know that prolonged irritation and the presence of scar tissue may give rise to a cancer, but in a lifetime I have seen little evidence that they do so except in squamous epithelium.

On the other hand we need not be too philosophic. A large chronic gastric ulcer causes constant misery even if it does not cause cancer, and gastrectomy is one of the most satisfactory and, in practised hands, one of the safest operations in surgery. An ulcer in the bucket has never been known to become malignant.

We must suspect malignancy or a premalignant character in all gastric ulcers first appearing after the age of forty, in all those in the prepyloric inch, and in other parts of the stomach that are not on or adjacent to the lesser curvature, in those exceeding an inch in diameter, in those that do not heal after a month's strict medical treatment in bed and in which occult blood is still found in the stools after such treatment. All these should be submitted to surgery without further delay.

I would conclude by repeating that the early diagnosis of cancer in any internal organ depends, in the main, on clinical judgment, on the early confirmation of what can, in most cases, be no more than a suspicion. We can all remember instances of a diagnosis of malignancy made on clinical grounds, of repeated examinations by experts giving repeated denials, of confirmation coming too late for curative treatment. To doubt is safer than to hope. And if our suspicions continue, if the weight continues to fall, we must insist on an exploration. There is more rejoicing in heaven over the one laparotomy that fails to find cancer than over the ninety and nine (positive ones) that find it too late.

surgery, and the brilliant operator thus became the acknowledged leader of his fellows. To-day the operation is regarded as part of a plan of treatment which precedes and follows it till its object has been attained rather than an isolated *tour de force*, and interest centres more in measures to eliminate its risks and counteract its effects than in the development of spectacular technique. The details of asepsis have been improved one by one, till chance infections are almost unknown. The sterilization of gowns and dressings is now certain rather than hoped for, the air in most modern theatres is conditioned—that is, washed, filtered, and rendered bacteria free before being put into the room, some enthusiasts have even introduced a ring of mercury vapour lamps round the operating light, following the suggestion of Hart, of Connecticut, to sterilize the air over the working field itself. But air and dust borne organisms are usually non pathogenic or of low virulence, and do not constitute a danger comparable to that of the human streptococcal carrier. The researches of Colebrook and others have shown how chance infections may be avoided and cross infections prevented, and chemotherapy, the scope of which is being yearly extended, has enabled us to abort infection at its first appearance, and to fight it, or rather help the tissues to fight it, in its later stages.

If the outlook and methods of surgery are changing, so is its material. Whenever we prepare a lecture to students we are reminded, in the depressing way that everything seems to remind us of the passing years, that diseases are not what they were. They, too, have their enemies, and natural immunity, medicine, surgery, and public health have all combined to eliminate the favourites of yesterday.

Bacterial diseases, like tribal migrations, are most calamitous when they first descend on a populace unprepared for them, with time, resistance is organized, the invaders weaken and finally disappear. Syphilis ravaged the world at the close of the fifteenth and beginning of the sixteenth century, it remains a scourge, but its manifestations, even in untreated cases, are becoming milder. Tuberculosis is even more evidently doomed to extermination by the gradual development of natural immunity. Its incidence and its mortality have both dropped steadily during the last fifty years, and the satisfaction which we as doctors might take from

insufficient mastication and the angulation of ptosis, the typical gastric ulcer patient is a timid, depressed, and sedentary old lady, with poor muscle tone and a low acid curve. Duodenal ulcer, on the other hand, is associated with worry, overwork, and the excessive smoking that accompanies these two, the duodenal patient is a live wire, a go-getter, a high pressure salesman, a hundred per cent man, thin, restless, with a small stomach and hyperchlorhydria. His type is increasing, and so undoubtedly is duodenal ulcer, and for the first time it is becoming fairly common in women. While this increase in duodenal ulcers is undoubted, I cannot support it by my own figures, since in them gastric ulcers predominate. I find that much of my time at the out patient department is spent persuading gastric ulcer patients to have an operation and duodenal patients not to have one. Gastric ulcer, if medicine has not cured it early, is a surgical disease, and the results of excision are excellent. Duodenal ulcer is the outcome of high pressure living: if the patient can be persuaded to mend his ways the ulcer will disappear without surgery, if he cannot, surgery, unless it is of a most drastic nature, will give him only temporary benefit. One of the most manifest changes in the surgical outlook within recent years is that the great body of men of experience and judgment are agreed that in duodenal ulcer operation should be reserved for the complications—perforation, stenosis, severe haemorrhage, and persistence associated with fixed deformity—and not be looked upon as a cure for the ulcer tendency.

Graves' disease, again, is a malady which is very constantly associated with emotional shock. Many of the functions of the thyroid gland are understood, but its place in the complicated corporation of ductless glands, whether that of a director or merely of a bulky foreman, is not yet unravelled. Crile looked upon the thyroid as the regulator of constant energy output as the adrenals are of intermittent outbursts. He pointed out that the great majority of animals are either hunters or hunted, always alert for attack or escape, always ready to spring from rest to intense activity. Two creatures alone are lords of all they survey—man on the earth and whales in the ocean—and in them alone does the thyroid exceed the adrenals in weight. The definite association of thyroid activity with the important phases of

this fact is shaken by the notable absence of any acceleration in the downward curve when Koch discovered the organism or when open air treatment was advocated. The youngest student to-day will possibly see tuberculosis vanish from the face of the earth.

Medicine, or rather therapeutics, by the improved drug treatment of syphilis has abolished almost entirely the third stage of that disease. In 1910 about one quarter of the patients whom I saw on surgical and dermatological out patients' rounds came for some manifestation of tertiary syphilis. In the last six months I have found only a single gumma, and that a doubtful one. Surgery, by the routine repair of herniae and the early treatment of urethral stricture, has almost wiped out strangulation and extravasation of urine, the 'high lights' of an emergency week in my student days. Radium and X ray therapy have claimed most cancers, apart from those of the alimentary canal. Public health and improved economic conditions have reduced the incidence of gastric ulcer and put rickets and osteomyelitis into the ranks of the rare and disappearing diseases.

Lest you should think that these remarks are a prelude to a swan song of surgery, I would hasten to say that there is always a new generation of diseases knocking at the door. The very advance of civilization, which has removed those troubles due to poverty and ignorance, is bringing others peculiar to itself. I can mention only two factors that seem to be operative: the rush and the strain, the competitive element, and the constant feeling of insecurity in modern life; and the unnatural diet, consisting largely of foodstuffs preserved to be eaten long after their time of preparation and far from their place of origin, and therefore robbed, for canning purposes, of all portions that cannot be proved to have a high nutritive or vitamin value. These factors are responsible, the one for the appearance of new diseases and the increase in old ones due to nervous stress, the other for the apparently increasing incidence of infections of the alimentary tract. Both bring fresh problems to surgery.

Duodenal ulcer is essentially a disease of civilization, a fact that we shall appreciate more fully if we try to dissociate it in our minds from gastric ulcer. The chief causes of gastric ulcer seem to be sepsis, undernutrition, or faulty diet, and trauma caused by

insufficient mastication and the angulation of ptosis, the typical gastric ulcer patient is a timid, depressed, and sedentary old lady, with poor muscle tone and a low acid curve. Duodenal ulcer, on the other hand, is associated with worry, overwork, and the excessive smoking that accompanies these two, the duodenal patient is a live wire, a go-getter, a high pressure salesman, a hundred per cent man, thin, restless, with a small stomach and hyperchlorhydria. His type is increasing, and so undoubtedly is duodenal ulcer, and for the first time it is becoming fairly common in women. While this increase in duodenal ulcers is undoubted, I cannot support it by my own figures, since in them gastric ulcers predominate. I find that much of my time at the out patient department is spent persuading gastric ulcer patients to have an operation and duodenal patients not to have one. Gastric ulcer, if medicine has not cured it early, is a surgical disease, and the results of excision are excellent. Duodenal ulcer is the outcome of high pressure living; if the patient can be persuaded to mend his ways the ulcer will disappear without surgery, if he cannot, surgery, unless it is of a most drastic nature, will give him only temporary benefit. One of the most manifest changes in the surgical outlook within recent years is that the great body of men of experience and judgment are agreed that in duodenal ulcer operation should be reserved for the complications—perforation, stenosis, severe haemorrhage, and persistence associated with fixed deformity—and not be looked upon as a cure for the ulcer tendency.

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woman's life—puberty, menstruation, and pregnancy—and the frequency of all thyroid diseases in females, might be cited in further support of Dr Crile's contention that thyroid dominance is the mark of a superior place in the scale of creation. Be that as it may, Graves' disease has hitherto been seen almost exclusively in women, and chiefly in young women of the age when emotional crises are common. Within the last few years an increase which is apparent to any surgeon interested in thyroid work has been noted in the incidence of Graves' disease in men, almost entirely those of intermediate social position. The millionaire may have worries, but they are not serious enough to affect his thyroid, the labouring man can put all his troubles on the broad shoulders of the State, but the clerk nearing forty with an increasing family and no promotion in sight, the small business man threatened by powerful competitors, the schoolmaster uncertain whether he can hold his job down—these people must carry their responsibilities alone, and they are showing the strain by developing hyperthyroidism. It is, indeed, fortunate that the operative treatment of Graves' disease has been transformed within the same period from a chancy but fairly sound procedure to one of the safest and most satisfactory in surgery. One cause is the worthy circle (for not all circles are vicious) that good results brings patients at an earlier stage, and fitter patients mean yet better results, another is the use of iodine, which, though it has no curative action, yet enables the physician, by doses checked against frequent basal metabolic estimations, to bring any goitre patient to a condition approaching that of a normal individual for a few days and to predict to his surgical colleague when that time will come, yet another is the standardization of operative procedure to a bilateral subtotal excision of the thyroid gland leaving no more than two cubic centimetres of gland tissue on each side in the tracheo-oesophageal groove. Most important is the division of labour between the physician and the surgeon, the former accepting responsibility for the preparation, for fixing the date of operation, and for the after-care, the latter content to work under orders and do no more than guarantee to return a live patient with a reasonable scar covering a job neatly done.

Most alarming among the problems presented to surgery to-day is that of arterial hypertension. High blood pressure with its

consequences is nothing new, and many famous men have died of apoplexy or lost their fire in the dotage of cerebral softening. But they were old, and reached this 'last infirmity of noble minds' after a long life of scorned delights and laborious days. The tragedy of the present time is that men and women are succumbing to the stress before they have time to bring their ideas to maturity or to reap the reward of their labour. Still under thirty they are stricken with intolerable headaches and failing vision, and find themselves unable to concentrate without a further increase in these distressing symptoms, which are associated with a systolic pressure that may be from 200 to 300 mm. of mercury, and a diastolic pressure correspondingly raised.

Such a problem has naturally received the fullest attention from research workers, particularly in America, where this scourge of the intellectual is increasing rapidly. Hypertension does not occur spontaneously in animals, but it can be produced by applying a clamp to the renal pedicles and closing it gradually. If the arterial supply is so reduced that the nutrition of the kidneys is impaired, albumin and casts appear in the urine, and a condition comparable to the hypertension of renal disease in man is reproduced. But by gradual occlusion a point can be reached short of renal damage where the systolic pressure of the animal is raised and remains up as long as the clamps are kept on the pedicles. The hypertension thus produced resembles non renal or essential hypertension in man, but is certainly not identical. Experimental hypertension persists as long as the obstruction to the blood supply of the kidneys is maintained. It is not a reflex effect, for it remains when all nerves to the kidney have been divided, and even when one kidney is removed and the second transplanted to the thigh—an irrefutable denervation. It may be lowered by various operations, such as transection of the cord, designed to dilate the arterioles of a wide area, but this depression is temporary. It appears likely, therefore, that the hypertension is due to some pressor substance produced in the kidney when its blood supply is jeopardized.

In man, on the other hand, the blood pressure can be lowered in many ways. Surgical alleviation of these victims of an intellectual machinery that has run its bearings was first suggested by the profound fall in systolic pressure that follows a spinal

anaesthetic, and the operations performed to-day have all been designed to remove the vasoconstrictor impulses from a large part of the splanchnic vascular bed. Whether the resulting benefit is due to reduced peripheral resistance in the arterial tree, or whether, as seems more likely in view of the experimental evidence mentioned above, it depends upon the denervation of the renal vessels alone—'the removal of Nature's renal clamp'—is uncertain. Many alternative procedures are undergoing trial. Their relative merits are still undecided, the choice of suitable patients varies from surgeon to surgeon, and the benefits that may be expected from any or all of them have still to be assessed.

The results obtained after operation for hypertension seem to vary in the most remarkable manner, even in groups that should be comparable—that is, in patients of similar age, with an identical clinical syndrome and treated by the same operation. As might be expected, therefore, surgeons differ considerably in their indications for operation, in their criteria of operability, in the enthusiasm with which they regard this branch of surgery, and in their outlook on its future.

One of the wisest surgeons in the United States, himself a neurosurgeon, told me that he felt as yet quite unable to foresee the ultimate outcome of this work, but he thought it was well worth continuing. A symptomatic improvement seems to occur in every case—that is, the patients lose their headaches, and their vision improves—but in many of these there is no appreciable drop in the systolic pressure to explain the improvement. Some, though their pressure remains unaltered, become sensitive to drugs such as cyanates, to which they were formerly resistant. Many show a fall in blood pressure of about half the amount by which they exceed the normal, but after a few months they start to climb, and by the end of the year they have reached their former figure. A few return to normal or near normal, and remain at that level. Four years ago a surgeon of about forty was forced, by a rising blood pressure, inability to concentrate, headaches becoming at times intolerable, and failing vision, to resign his university post and abandon his practice. He underwent the operation of bilateral splanchnicectomy, and immediately lost all his symptoms and returned to a normal blood pressure. He obtained another post at a university in another State, and

has been in full work ever since, his blood pressure showing no tendency to rise again. I had not the good fortune to meet him, but I met many of his colleagues, and they all agreed that he was now able to work as hard as any of them. To my question as to whether he was as good a man as before his symptoms appeared, they replied that he had lost some of his fire, he was not the 'go-getter' he used to be, but he was still a fine surgeon. Many of us are apt to become less energetic between forty and forty four, without the excuse of an operation to explain it, and would count the loss of some enterprise a small price to pay for rescue from idleness, imminent blindness, and impending death. It is cases like this—and they are by no means rarities—that illustrate the possible value of surgery in hypertension, and provide a reason for its fuller study.

That infections of the alimentary tract are on the increase is undeniable to one who surveys the change in surgery over even a brief period. I was sufficiently impressed by this increase in 1923 to attempt an experimental investigation of its cause that formed the basis of a Hunterian lecture the following year. In that lecture I sought to prove that bacteria are normally carried through the intact wall of the alimentary tract, and that in conditions of injury or stasis the number passing through is considerably increased. I suggested that such stasis is an almost inevitable sequel of the modern dietary, which differs from that of our ancestors in two main respects: the high degree of preparation to which our cereals are subjected, robbing them of many vitamins, and the smaller and still lessening amount of indigestible material, chiefly cellulose, which we consume.

Whatever its cause, the most striking manifestation of this increase is seen in appendicitis, which first appeared as a relatively common disease at the beginning of the century and has since become more frequent every year. Some would explain this appearance and increase by saying that appendicitis was formerly just as common but seldom diagnosed. The clinical acumen of our predecessors cannot be assessed, but their post mortem reports survive in their detailed thoroughness, and it is very unlikely that the association between peritonitis and a gangrenous appendix would have escaped the eyes of men like Gull and Wilks. Bright described infection of the vermiform appendix

of others in the family similarly affected, and that can usually be recognized by sigmoidoscopy or contrast radiography. Apart from its complete intractability polyposis nearly always goes on to cancer, and therefore demands excision—segmental in those rare instances where part of the colon can be proved to be free, total colectomy in the majority. The third condition to be excluded is bacillary dysentery.

There remains a large group that must be classed as true ulcerative colitis, a disease for which specific streptococci have been held responsible by Bargen and others, but about whose primary cause no agreement is yet possible.

The medical treatment of ulcerative colitis does not concern us here, except to know that it often fails and that these failures provide a new problem for surgery. Between the successes and the worst failures, those patients who have gone progressively downhill and are poisoned and bloodless, lie the intermediate and more important class of those that are bound to fail, but are not yet at the point of death, and therefore provide the most promising material for surgical treatment. When the colon has at last been got to heal after prolonged ulceration, when its wall is thick, rigid, and fibrous, and the scars on its mucous coat are covered with a single layer of non glandular epithelium, it may act as a reasonably efficient sewer while it is flushed out repeatedly and asked to transmit no more than paraffin lubricated pulp, but it cannot function as a colon and is bound to ulcerate on the first attempt to restore normal diet, at the first period of lowered resistance.

The surgical treatment of the ulcerated colon may be divided into two steps—rest and excision, to which a third, restoration, is sometimes added. Rest of the diseased bowel can be obtained only by complete transverse division of the ileum six or eight inches above its termination. Appendicostomy and caecostomy have both passed into disfavour: the feeble flushing of the colon which they allow does not appear to be as effective as washing out through the rectum, and neither of them rests the colon to an appreciable extent. Transverse ileostomy, however, diverts the whole intestinal flow to the surface. The colon, no longer filled with bacterial pabulum, mechanically irritated, or stimulated to contract, rapidly becomes more healthy. It is not to be

in 1839, but did not look upon it as a common disease. Others, again, ignore this increase in their attempt to find statistical support for a revival of the pre Listerian treatment of appendicitis by procrastination. They point to a slight rise in the total mortality for appendicitis in Britain over a ten year period as evidence that early operation has not lowered the death rate, omitting to allow for any increase in the total incidence of the disease. An examination of the hospital records of South East London, however, shows that during the same period the number of operations for acute appendicitis has increased by 260 per cent while the number of deaths has risen by 8 per cent only.

Ulcerative colitis is another alimentary tract infection which, though old, has become common only during the present century and a subject for surgical attention during a much more recent period. The term is used somewhat loosely to describe a group of disorders of the large intestine characterized by the passage of frequent loose stools containing mucus and often blood. Three conditions, at any rate, must be excluded before the label of ulcerative colitis is applied. The first and most important is that of 'irritable bowel' or 'maltreated bowel,' which becomes a disease when it is labelled mucous colitis. The distal colon is richly set with mucous cells whose purpose is to lubricate the normal excreta in transit, and whose habit is to pour out mucous when abnormal constituents appear. The bowel consciousness instilled by infant training becomes, in those lacking the interests of work or a family an absorbing passion that has made the fortunes of countless drug manufacturers, fashionable physicians, health resorts, and irrigation parlours. The vested interests that profit by the colon complex are indeed so powerful that it is only a few bolder spirits like Hurst who have dared to point out that habitual constipation is usually the result of habitual purgation, that intestinal intoxication is caused not by stasis but by the drugs given to relieve it, and that the Plombières' treatment can wreck the healthiest colon in a few weeks. The patient with mucous colitis can nearly always be put right if her drug chest, which will be found full to overflowing, is emptied into the dustbin and she is put on a rational diet and exercises and given something to do.

The second condition that must be excluded is multiple polyposis, a disease that may be suspected when there is a history

of others in the family similarly affected, and that can usually be recognized by sigmoidoscopy or contrast radiography. Apart from its complete intractability polyposis nearly always goes on to cancer, and therefore demands excision—segmental in those rare instances where part of the colon can be proved to be free, total colectomy in the majority. The third condition to be excluded is bacillary dysentery.

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expected, in the advanced type of case in which such a grossly destructive operation as colectomy has come to be considered, that it will recover sufficiently to function again, but the discharge becomes one of purulent mucus, rapidly decreasing in amount, bleeding gets less or stops entirely, and the absorption of toxins is diminished when infected fluids no longer reach the ulcerated surfaces and mass movements do not aid the lymphatic and venous flow. Almost as important as the mechanical exclusion is the fact that the diet need no longer be chosen to spare the colon. Part of the difficulty in treating the disease is to provide a diet that gives a minimum residue, yet is varied, appetizing, and sufficient in all elements. After ileostomy the patient may be fed on anything and everything, and this alone causes a marked improvement. To start with, the ileal efflux is watery and almost continuous, dehydration is apparent, and the skin round the opening gets sore. But the capacity to absorb water is soon acquired, and the outflow takes the consistency of putty and is discharged at intervals that may be as long as four hours.

As soon as the patient's condition will justify a further operation the diseased colon is removed. It can usually be resected down to the pelvi-rectal junction or lower in one stage, but no more need be done than the difficulties at the time and the reaction of the patient to operation will allow, the proximal end of the remaining colon being brought to the surface when the incision is closed, to form the start of the next stage.

With the patient fit again after colectomy, restoration is occasionally undertaken if it is considered advisable when the disability and the gain to be attained are set against the difficulty and severity of the operation and the chances of failure. When the rectum has been spared, restoration implies no more than implanting the ileum in the stump, but this course is seldom practicable, the remaining segment has usually shrunk to a small fibrous track, and even though it may appear reasonably healthy, its re-employment will probably lead to recrudescence, to bowel frequency with dribbling and tenesmus, discharge and fissures or fistulae, so that it is necessary to return to an ileostomy. Since ulcerative colitis usually affects the rectum and pelvic colon more than any other part, excision of the rectum is necessary in most cases to eradicate the disease. When the rectum has

been excised restoration of the normal means implantation of the distal ileum in the anal sphincter, and implies, first, a conservative excision of the rectum, which in the presence of ulceration and perirectal fibrosis may be almost impossible, and later a difficult dissection to reopen the old rectal bed and transfer to it the mobilized ileum

Crohn's disease, or regional ileitis, can lay as just a claim as any to be a new disease, for though several cases of the disease were reported by Dalziel,¹ of Glasgow, in 1913, it was first described as an entity by Crohn, Ginzburg, and Oppenheimer in 1932. Single cases had been reported as rarities by previous observers, but these authors were able to study a series in Mount Sinai Hospital, and to establish the clinical and pathological features of the condition. Since their paper it has been shown that the changes peculiar to this infection are not limited to the lower ileum, but may occur higher, and even in the proximal colon, so that regional enteritis is probably a better term than regional ileitis.

Regional enteritis is a non specific granulomatous infection of unknown aetiology, progressing steadily and ultimately fatal, unless treated surgically. The affected segment of bowel is thickened, rigid, and red or purple in colour. Its lumen is reduced usually to the diameter of a pencil or even smaller. On laparotomy the appearance is characteristic: the thickened rigid bowel, the sharp demarcation at each end of the affected segment, and the extensive involvement of the mesentery over the same area being unlike anything else. In microscopical section the wall of the intestine is seen to be almost entirely replaced by vascular granulation tissue, with large foreign-body giant cells, but all tests for the tubercle bacillus are negative.

Clinically, Crohn's disease may be met with in many puzzling forms. Perhaps the most typical picture is that of a young man or woman who has been ailing for two or three years, losing weight steadily and showing obvious anaemia. During this period there have been attacks of cramp-like abdominal pain accompanied by mild diarrhoea and a moderate pyrexia. Other cases, progressing more rapidly, resemble subacute appendicitis, indeed, the differential diagnosis from recurrent appendicitis may be very

¹ T. K. DALZIEL, 'Chronic Intestinal Enteritis,' *B.M.J.*, 1913, II, p. 1069

difficult, for there is usually tenderness and often a lump in the right iliac fossa, and only occasionally can this be recognized as a tubular ileum, because of the mesenteric oedema that obscures its outlines. Others develop spontaneous muco-cutaneous fistulae. In others, again, the symptoms of obstruction predominate. A barium meal will often solve the puzzle by showing a narrow rigid channel replacing the normal outline of the lower ileum.

The treatment of regional enteritis is essentially surgical. No spontaneous cures have been reported and without operation fistulae appear or obstruction supervenes. Many patients are too ill to stand resection when they are first seen, and in them an anastomosis must be made between the ileum above the disease and the transverse colon in order to rest the affected segment and avert obstruction. A few so treated may regain their health without further operation, but Mixer has found that in the majority treated by exclusion alone the disease is not arrested, but continues to spread. Resection of the affected segment with as much as possible of its mesentery and at least two inches of healthy bowel above and below it must therefore be looked upon as the correct treatment, to be undertaken as a primary operation in those who are able to stand it, and after exclusion in those who are *gravely ill*. Since the disease commonly affects the terminal ileum, resection usually implies removal of the caecum and ascending colon in addition.

In discussing changes in surgery we must beware of accepting the view that change and progress are synonymous, that what is new is better than what went before, or even necessarily good. The study of diseases, newly arrived or newly handed over to surgery, provides us with interest, but our enthusiasm should be reserved for those changes, often very simple ones, that lead us to something better. If we consider any condition now treated by surgery and ask ourselves, 'How can we improve the results we are getting to-day?' we can find two simple answers: first, by getting the disease at an earlier stage, before it has spread widely, before it has injured adjacent parts, before the patient is ill, secondly, by modifying our operation to give the best possible results. Both of these demand not genius, not brilliance or technical skill, but independent observation and constant hard

work Disease in its early days is betrayed by symptoms, signs belong to its later and less happy stages By watching our patients carefully, by listening without prompting, by recording their story, however irrelevant it may appear at the time, and by comparing our notes with the exact knowledge brought to us later in the operating theatre, the laboratory bench, or the post-mortem room, we shall acquire a store of material from which we may be able to build new clinical pictures—pictures that we shall recognize when they come again, that may allow us to disentangle new diseases from the mixed class in which they are now hidden, and to recognize old ones at an earlier stage I need only remind you that it was by such methods, nothing more dramatic, that Moynihan first drew the picture of duodenal ulcer, showed it to be not a rare disease but one of the commonest, and laid the foundation of a reputation that has seldom been equalled By such methods my colleague Ryle has made contributions to clinical science that stand as models of accurate observation, conscientious recording, and painstaking analysis

An outstanding example of that careful study of results which allows an old operation to be remodelled, so that it is virtually a new one and certainly a better one, is provided by the work of Dukes and Gabriel in cancer of the rectum Dukes's dissections have shown that the spread of this growth is entirely upward in hopeful cases, have laid the foundation for a safer and more satisfactory operation, and have justified the revival of conservation of the sphincters in a few high and early growths Gabriel's careful study of results has shown that what the pathologist predicts does actually take place

There are few problems that we cannot hope to resolve by inquiry along these two lines We are all depressed by our results in cancer of the stomach But if we can trace some clinical feature in the earliest phase of departure from health common to all those patients who later come with advanced growths, we may hope to get more in that very small group where radical resection is possible If we can discover by detailed microscopical dissection of the removed specimen where the resections we now perform are not wide enough, and learn by the study of post-mortem examinations where recurrences appear after operations that seemed hopeful at the time, we shall have knowledge that

will enable us to modify and to extend our surgery in directions that will increase the proportion of cures

Other growths will be brought within our reach by means no more spectacular. The first successful resection for cancer of the oesophagus was twenty five years ago, but till 1936 the operation had only succeeded six times, and the mortality was within a decimal point of 100 per cent. In 1938 I saw three cases successfully treated by Garlock, of New York, and two more by Wooky, of Toronto—that is, five in one year by two surgeons. Now in 1948 resection of the oesophagus is being performed successfully by surgeons in every important centre, and the proportion of five-year cures is rising steadily. We may hope that the mortality of this operation, in the hands of expert surgeons, will be reduced below the present mortality in cancer of the stomach, and that the cure rate will be much higher, for oesophageal growths are of lower malignancy. We only need the clinical picture that will allow us to recognize the disease before obstruction appears.

Change is everywhere, and change is desirable, for change is life. Only when we are dead do our osteoblasts and osteoclasts cease their tireless moulding and rebuilding, and our skeletons remain a changeless memory of the shell that once held our sorrows, hopes, and fears. *It is good to live in a period of changes, to be concerned with the changes that are taking place in our art, to know that they are changes for the better, and to realize that among our fellow-countrymen and fellow townsmen are names that will always be remembered as leaders of the advance*

14 PHYSIOLOGY AND THE SURGEON¹

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THE art of medicine was old before universities were founded, but the science of medicine is younger than all but the most recent of them. We often picture the development of medical science as the slow building up or deduction of knowledge from experience accumulated over many hundreds of years, but the fact is exactly the reverse. Medicine, in common with other sciences, began *a priori* with inductive reasoning from general assumptions about the nature of life and disease, and only gradually came to use what are now called scientific methods of experiment and observation. The scientific outlook, which has recourse to inquiry rather than assumption, appeared with the Renaissance, and inspired men like Vesalius and Harvey to spurn tradition and seek for truth. It was not, however, till the closing years of the seventeenth century that the attention of physicians was turned from the investigation of abstract medical problems to the study of the sick. Two men stand out as leaders of this new created science of bedside study—Sydenham in England and Boerhaave in Holland. Of the two, Boerhaave has the greater claim to be called the founder of clinical medicine, for while Sydenham was a courtier and writer, Boerhaave was a magnetic teacher, whose lectures attracted the best students from every country in Europe and established Leyden as the chief centre of medical education at that period. Monro, Rutherford, and Cullen, founders of your medical school, sat at his feet and brought his inspiration to Scotland.

Medicine, then, has advanced by slow approach from the lecture room to the bedside. Surgery has developed along similar lines, but in its history there are two distinct periods. Till Lister it profited by the general progress in the knowledge of disease, but differed little in its practice from that of the dark ages. Surgery, as we know it, was born in this country, it is but

¹ Address to the Royal Medical Society, Edinburgh.

sixty years old, and the transition from the academic to the clinical outlook is only now taking place before our eyes. The advance from the anatomical to the physiological conception is part of this transition.

Anatomy, though it appears to the student beginning his dissections as the most practical and least abstract part of his medical training, is, in actual fact, no less academic than his preliminary physics and chemistry. For it deals, in the first place, with an abstraction—the body as a structure. It dissects the dead frame to see how it works. But when the body is dead it does not work. Extraordinary as it may seem, it took more than a thousand years for surgical education to perceive and act upon this fact, and in some quarters it is tacitly denied to this day. Medicine is still looked upon as applied physiology, surgery as applied anatomy—and this instinctive grouping is reflected in the paths whereby the aspirants to higher positions in either approach their careers. The budding physician serves his apprenticeship as a demonstrator of physiology, the young surgeon in the dissecting room.

Now I have no wish or intention to belittle the importance of anatomy. The surgeon, as his title implies, works with his hands, and he must, above all things, be an expert in topography. His anatomical knowledge must be so detailed that no problem can find him unprepared, so thorough that it is part of his subconscious mental processes. He can only acquire this knowledge by prolonged and painstaking work. But anatomical learning, which in the early days made up the whole scientific equipment of a surgeon, is but the beginning and rude, though strong, foundation of his art. It is necessary, indeed, but only like grammar to a writer or mathematics to an architect. For we must realize that, just as grammar cannot by itself make sense, but is only the means whereby an idea already formed is clearly expressed, so anatomy is not the human being, but only the form and structure of his person. The surgeon who regards structure only cannot advance his subject except in technical detail, or even do his day's work with intelligence or insight.

Some of you may think that surgery, being a form of treatment, is concerned only with its manual operations, that it is the province of the pathologist and the physician to study the causes of disease and the principles of cure, and of the surgeon merely

to give those principles effect, that the limits of technique have already been fully explored and nothing remains but to repeat those procedures which have already been perfected. All operations that can be done, or nearly all, may have been done. Yet it does not follow, because no striking innovations are to be expected, that further advance is unlikely. Advance does not necessarily mean progress to something new—it means progress to something better, and improvement very often awaits the application of principles that are so simple and familiar that we have become oblivious of their presence. We cannot even go from one theatre to another in the same hospital, without being aware of the great divergence in the methods used by different surgeons to treat the same disease. Which is right? Surgery is not complete till we can give the answer to this question, and we can only do so by applying the test of function. Our patients are not interested in pathology, they are not even concerned with form except in the limited field of cosmetic surgery. They come to us because of some disorder of function, and will judge our treatment by whether function is restored or improved as the result of it. Therefore, in planning the measures we shall take to relieve them, be they operative or otherwise, we must ask ourselves 'How and why has function been deranged in this case, how can normal function be restored or, failing that, how best imitated, how do the operations we plan produce the effects they do, and how are those effects altered by various modifications—how much will they improve function, and for how long?' We must turn to physiology, whose province is the study of function and of the interdependence of organs and systems, as something which is neither chemical, physical, nor anatomical, but transcending and uniting these characters.

The narrow anatomical outlook, which considers form and position without reference to normal and disturbed function, has been responsible for many ill-considered surgical procedures in the past. Among such are the methods for repair of hare lip and cleft palate, which treat the defect as so much lifeless material to be dovetailed like wood, or those operations for hernia, which regard the inguinal canal as a mechanical valve rather than a living sphincter. Perhaps the most unfortunate example of this mistaken thinking concerns visceroptosis. Visceroptosis means

dropping of the viscera, in this case the contents of the abdomen. What are dropped viscera? Why do they drop? and what symptoms are associated with their declension? Cunningham tells us the exact shape, size, weight, and position of every organ, in an appendix he instructs us how to mark its situation on the surface of the body. To the anatomical mind an organ which lies below its allotted level has undergone ptosis. But radiography, first introduced to study disease, has brought a new chapter to anatomy—the topography of the living. A study of large series of normal individuals, and for this purpose the medical student has supplied willing and readily available material, discloses a surprising variation in the position of all the abdominal organs in men and women who have never shown any departure from robust and symptomless health. A Rugby international may have a stomach whose greater curve reaches the pelvis, an hepatic flexure in the right iliac fossa, his viscera are low, but he is not visceroptotic. When we say that a patient has visceroptosis we mean that he is complaining of a train of symptoms which are in part due to delay in the propulsion of the contents of the hollow organs, in part of psychological origin.

Anatomy is interested in the low position of the viscera that usually accompanies such a state, physiology inquires how the viscera are normally kept in position, how this normal mechanism has failed, how far the symptoms are due to altered position, and how the normal function and support can be restored. We learn that the abdomen is not a box with a lid in front, to whose walls the contents are hung like clothes in a cupboard, but a cavity shaped like an inverted pear, with a solid wall behind sloping backwards at 30° , and muscular curtains above, in front, and below (Figure 1). The organs are bedded in shelves on the posterior wall or slung to it by peritoneal folds, but these attachments have little power to maintain the shape or counteract the efforts of gravity to crowd them into the pelvis. The viscera are kept in shape by the tone of their own walls, and in position by the tone of the abdominal muscles and pelvic floor. Failure is due to lack of tone, and tone in turn is dependent upon influences from higher centres, and ultimately on psychological control.

The treatment which is suggested by topographical considerations is the restoration of the dropped organs to their orthodox

position, and various operations by slings, stitches, and artificial adhesions have been designed to secure this result. But a hollow

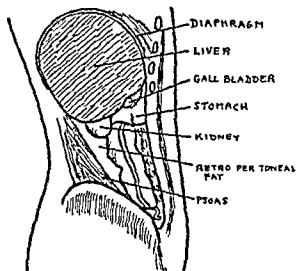


FIG 1.—Diagram to indicate the shape of the abdominal cavity and the part played by the abdominal wall in maintaining the viscera in position.

organ propelling gas or fluid must be free to contract, to alter its diameter and length. It drops because it has ceased to contract efficiently, and not the reverse. Therefore any method of fixation which imparts a rigidity to its walls that is not normal to them, and limits their already feeble movements, will interfere still further with its function. It will be weighed down with contents which it cannot expel, and will drop again, irremediably. The treatment of visceroptosis is the restoration of tone—psychological tone, tone of the abdominal muscles, and tone of the visceral walls.

In the short time at my disposal I cannot discuss the many possible applications of physiological teaching to surgical practice, and must confine myself to the consideration of every day problems in the light of function. Surgery can only drain, excise, and repair. The first two call for skill rather than thought, it is in the surgery of repair that physiological thinking comes into its own, for that repair will be best which works best.

In the treatment of fractures, where the problem is one of repair alone, the conflicting claims of form and function have been at variance throughout the ages. The one seeks a perfectly reconstituted bone, the other is more concerned with the joints, muscles, and circulation of the part as a whole, the first demands fixation, the second use. Each school has produced evil results as well as good—wasting and stiffness in the first case, malunion in the second. It has remained for Leriche and Policard to point out the relation between blood supply and the growth and repair of bone, and for Bohler to give these discoveries practical expression. Prolonged immobilization leads to diminished circulation, fibrosis of muscles and joints, and the deposition of sclerosed and avascular bone. Movement of repair tissue causes injury, injury in turn calls forth hyperaemia, and hyperaemia leads to decalcification, union is delayed, and the weak callus which forms yields to the stresses of movement. The ideal is the functional use of a part whose injured structures are firmly immobilized, by this means the circulation is maintained at its normal level, the nutrition of muscles and joints is unimpaired, and healthy callus is laid down and rapidly transformed to true bone. This ideal is obtained in most cases by use of the unpadded plaster case, which fixes the bone but allows the limb to be used. It is unnecessary to point out that Bohler's methods have transformed the treatment of fractures within recent years, but it is surely remarkable that these simple principles have been appreciated only in our time, though fractures have been recognized since man was conscious that he had a skeleton, and plaster of Paris was known to the builders of the pyramids.

Here we have an advance of first rate importance to mankind, brought about by the application of simple principles to everyday problems, and the use of ordinary apparatus in a new way. Is it not possible that the solution to many of our difficulties is also to hand, waiting for us to use it? Our curriculum is so sharply divided into compartments by barriers represented by examinations, that we are apt to look on the knowledge gained in each stage of our careers as a separate store, to be memorized and kept apart. The workers in each of these departments are often more concerned with the upper stories they are embellishing at the time than with the old treasures stored in the basement. It is for

less in a well planned incision, carefully sutured, but it is never absent. It may, however, be lessened, locally by the use of a slow-acting nerve anaesthetic such as quinine and urea hydrochloride, and centrally by morphia. In the early and liberal use of morphia we have one of the chief safeguards against most of the evils which follow abdominal immobilization. Relief of pain is not merely humanitarian: it preserves the patient's confidence, allows sleep, and encourages the use of the muscles from the outset. Morphia, to be effective, must be given before pain appears, and in sufficient quantity, repeated if necessary. The old belief that it interferes with peristaltic movements has, I think, been conclusively refuted by the experiments of Magnus and of Plant and Miller.

It is of little avail if we enable our patient to use his abdominal wall, but do not allow him to do so. Our tactics must, however, reconcile two conflicting needs. As a physiological mechanism the abdominal wall demands activity. Its full and natural use maintains the venous circulation, and avoids the frequent complication of infarction and the occasional catastrophe of embolism, it maintains the aeration of the lungs and prevents pulmonary collapse, it keeps the tone of the muscles active and obviates that tardy convalescence and prolonged invalidism that is so common a sequel of laparotomy. As an injured structure it requires rest for repair and relief from strain for security. A well sutured wound has a tensile strength of about 40 per cent of that of the tissues before they were cut. During the first few days the tissues undergo autolysis while the sutures are being digested. By the fourth day the strength of the wound has sunk to some 20 to 25 per cent of the original. From the fifth day onwards fibroblasts are laid down rapidly and the strength increases, so that by the sixth day it is 50 per cent, and by the tenth day about 90 per cent of the normal. It appears, therefore, that wound rupture is most to be feared between the third and fifth day, and after that it becomes increasingly unlikely. But while repair requires rest, it is not necessary to rest the whole muscular system, or even the whole abdominal wall, nor need rest mean rest in one position. Let us set our faces against the routine use of the many tailed bandage and the Fowler position. The dressings are retained and strain relieved more effectively

are carried out several times a day, and that the appearance of fluid on the resumption of walking is treated, not by rest or splints, but by a firm bandage, so that the use of muscles unstretched by fluid will quickly restore the tone upon which the normal synovial circulation depends. Quadriceps insufficiency is now a household word, yet we never talk of abdominal insufficiency, a condition in every way comparable and very much more common. We have seen that the tone of the abdominal wall is the chief factor maintaining the position of the viscera. The same force is the agent which brings the venous blood back to the heart, and returns the diaphragm to position after its descent. It is not too much to say that perfect health is impossible without a perfect abdominal wall. Yet when its youthful curves disappear in middle-aged spread, how many of us regret more than the passing of our figures, or realize that the lassitude, the disinclination for exertion, and the mental complacency which appear at the same time, are all symptoms of insufficiency in the tone of this *important sheet of muscle*. As surgeons we should, however, be alive to the need of preserving abdominal tone, which is lost after abdominal operations just as much as is that of the quadriceps after excision of a semilunar cartilage.

We cannot traverse the abdominal muscles by peaceful penetration. We must cut them. But we should so plan our incisions that they do no permanent harm and interfere as little as possible during the process of healing with the abdominal movements, and we should so close them that muscles may be used from the start without risk of damage. A perfect incision would divide all structures along their lines of stress, so that contractions tend to approximate rather than to separate them, and the stitches do no more than obliterate dead space. Thus the gridiron is the only incision against which no criticism can be directed. For any but small operations, however, we must divide the rectus sheath across its transverse fibres, yet such a wound, well healed, should leave the abdominal wall undamaged, for like heals with like, fibrous tissue with fibrous tissue.

To avoid abdominal insufficiency the patient must use his abdominal wall after operation, he must want to use it, he must be allowed to use it, and he must run no risk in using it. Abdominal movements are inhibited by pain. Pain will always be

less in a well planned incision, carefully sutured, but it is never absent. It may, however, be lessened, locally by the use of a slow-acting nerve anaesthetic such as quinine and urea hydrochloride, and centrally by morphia. In the early and liberal use of morphia we have one of the chief safeguards against most of the evils which follow abdominal immobilization. Relief of pain is not merely humanitarian: it preserves the patient's confidence, allows sleep, and encourages the use of the muscles from the outset. Morphia, to be effective, must be given before pain appears, and in sufficient quantity, repeated if necessary. The old belief that it interferes with peristaltic movements has, I think, been conclusively refuted by the experiments of Magnus and of Plant and Miller.

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by tapes tied to strips of elastoplast, which are fixed to the skin on each side of the wound, but do not go more than half way round the trunk. These support the wound to start with, the dressing while it is required, and the morale of the patient while they remain.

Most surgeons have abandoned the Fowler position in the nursing of abdominal injuries. Formerly looked on as the key to postoperative treatment, it is now regarded by many as the source of all evil and the originator of most of the distressing or fatal complications that may follow abdominal section. It was supposed to give comfort and rest, it does neither. It was thought to encourage infected fluids to drain downwards, by increasing the negative pressure in the infra-diaphragmatic spaces it actually encourages the formation of a subphrenic abscess. It was said to lessen postoperative chest complications, on the contrary by enforcing immobility of the legs and lower thoracic cage it favours phlebothrombosis and pulmonary collapse in which most of them arise.

The worst strains to which an abdominal or inguinal incision can be subjected are not those of movement in bed, or even of getting out of bed, but of coughing and the use of the bed pan. No patient who has had an abdominal operation should be forced to get up, but he should be allowed from the first to use a commode rather than a bottle or a bed pan, and he should be taught to look on bed as a temporary resting place, in which he may move freely, and which he should leave when he wishes. He will get up as soon as decreasing pain allows it, which is never on the first day but usually about the fourth, showing that the call of nature has more sense than the caution of pedants or the insistence of enthusiasts. For although immobility is unphysiological, movement against inclination of a structure recently divided and sutured interferes with the local mechanisms of repair, and encourages haemorrhage, infection and wound disruption.

At the risk of wearying you further I would continue, as I have begun, to deal with commonplace knowledge. After millions of years on dry land we remain aquatic animals. We depend upon water for the ingestion, digestion, absorption, transference, synthesis, and final elimination of our food stuffs,

for the transfusion of gases across cell membranes, and for the regulation of heat—in short, for life. We can live for sixty days without food, but die in sixty hours without water. Fortunately water is everywhere available—everywhere but in the sick room. A healthy man requires about 6 pints a day, he can increase this amount with impunity, for any excess is quickly eliminated, but he cannot reduce it without danger. A surgical patient is often dehydrated before his operation. During its course he loses water by sweating, by exposure of moist tissues, and by increased pulmonary ventilation. Returned to bed, he vomits and often goes on vomiting. If he has a high temperature, persistent vomiting or diarrhoea, or an alimentary or biliary fistula, his loss of water will be very rapid. This man, already short of water, and needing far more than usual for the regulation of temperature, the metabolic processes of repair, and the elimination of the products of injury, finds himself for the first time dependent on others for its supply, and too listless to press his demands. Unless we see that he has plenty, that he takes it, and if he cannot take it that it is given to him, we shall be neglecting a primary duty, and risking the success of our operation. Dehydration, when fully developed, is recognized by a dry skin, parched tongue, sunken eyes, and by fever, restlessness, and delirium. But in lesser degrees it may pass unnoticed, yet do great harm. To avoid it there should be three rules in every ward: that a jug of lemonade sweetened with glucose is kept filled by every patient's bedside, that a total water intake of 6 pints a day is assured by one channel or another, and that a chart showing the daily intake of water and output of urine is kept for the first ten days after operation. The urinary excretion should reach 50 oz. on the second day, and be maintained at or above this level. I prefer this simple record to the fluid balance charts now in fashion, which convey a misleading semblance of verisimilitude, since the amount of water lost by respiration and sweating, a high figure in sickness, can only be guessed at.

An elementary point, often overlooked, is that patients need water and water only, or at most water and glucose. They have not lost mineral salts, and they do not want more than they would normally take in their food. But water, as such, can only be brought into contact with the mucous membranes and to these

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therefore we must turn as our ports of entry Water given directly to the tissues must be made isotonic with their fluids. For this purpose we usually use normal saline, but in this solution the osmotic pressure of a number of different salts is balanced by one of them alone. Sodium chloride in the plasma is only 0.6 per cent, so that our saline contains a relative excess of salt. For the sake of the cells at the point of entry we are putting into the body, which needs water alone, a great excess of a mineral element which it is obliged to excrete as fast as it can. I will not labour this point, which I introduce merely to emphasize once again that a drink of water is worth more than any amount of infusions.

Water should be given by mouth if possible, and in most cases it is possible. We have been taught that an operation on the stomach or duodenum prohibits this. But surely water, sipped slowly, puts no strain on our anastomosis, but rather keeps its surface clean, on the other hand a suture line is never less likely to give way than when it is freshly made. I give my gastrectomy patients water by mouth from the time they return to the ward, allowing up to 5 pints in the first twenty four hours.

When, however, the movements of the upper alimentary tract are in abeyance, as in gastric dilatation or peritonitis, we must give water by the rectum. Sheaf, of Guildford, has shown that by this channel up to 5 pints of water or saline may be given daily, but only if the normal physiology of the rectum and lower colon is respected. The rectum is the means whereby the debris of digestion, the final unwanted residue of several meals, is expelled from the body, when a faecal mass is transferred to it from the pelvic colon it responds by powerful contraction of its walls and, if the time and place are opportune, its owner co-operates by a relaxation of the external sphincter, and defaecation follows. Any distension of the rectum evokes this defaecation reflex and initiates these contractions, so that fluid given to it for absorption must be delivered at a very low pressure and through an apparatus that allows escape of contents whenever waves of contraction threaten to raise the intraluminal tension to the trigger point that fires off the reflex. Sheaf gives the fluids by a drip apparatus delivering into an open funnel fixed at the foot of the bed not more than twelve inches above the mattress, and joined

by a wide tube and wide connections to a wide rectal tube (He points out that the ordinary tapering glass connection interposes an obstruction that make failure inevitable.) With this apparatus, should the rectal wall contract, the fluid merely rises a few millimetres in the funnel or a column of gas bubbles out and the rectum again relaxes, the rectum is not provoked to expulsive efforts so that it 'refuses to take any more' as sisters report with the usual apparatus

Subcutaneous or single venous infusions have a very doubtful place in modern surgery. When water cannot be given by mouth or absorbed from the rectum, the need for fluids is usually urgent, and will remain so for several days. Some 15 to 40 pints may be needed in all. In such cases the method of continuous administration of saline glucose by the intravenous drip method has proved of supreme value. Venoclysis, described simultaneously by Matas and Hendon in 1924, and introduced into this country from Sweden in 1930, has now become so incorporated in standard practice that we forget that it is, perhaps, the greatest surgical advance of the last ten years. Others are new or better means of doing something that was done before. But the intravenous drip can save lives that were formerly lost—those of sufferers from late intestinal obstruction, general peritonitis, or advanced hepatic and renal failure.

A less straightforward problem meets us in the surgery of the stomach, for here repair, at any rate in such cases as come to the surgeon, can never mean the restoration of the normal. Gastric surgery deals with cancer and ulcer. The first demands radical removal, an exercise in anatomy. The second calls for surgical measures planned with careful thought, for the ulcer patient is rarely dying, but merely suffering from his disease. He complains of indigestion, pain, vomiting, anaemia, loss of strength and weight, he wishes to eat and to live normally once again.

The best thing we can do for him is to heal his ulcer and restore to him a normal stomach. If he comes to us early and follows our instructions obediently, we can do this by medical means. But in many instances, because the ulcer is so big that even if healed it will leave a weak fibrous scar, because it is fixed to neighbouring structures, because it is eroding a large vessel, because it is

possibly cancerous, or because he is unable or unwilling to follow a lengthy regime, operation is the only rational treatment.

In planning this operation we must consider our aims and our material. Under the first heading it is clear that we wish to remove the ulcer, to remove also its cause so that recurrence is impossible, to restore gastric digestion, not to normal but to the nearest approach to normal compatible with the first two requirements, and to avoid sequelae of other kinds which may be worse. Under the second, we must examine the structure and functions of the stomach and the causes of ulceration.

The stomach has often been likened to a muscular mill, slung about the lesser curve. This specialized band of muscle maintains the position of the stomach, but, except in its lower segment, takes little part in its movements. Foodstuffs accumulate in the fundus and body, where they mix with the gastric juice. The fundus exerts a constant pressure upon these contents, and feeds the mass towards the pyloric half, where peristaltic waves further digestion by mechanical mixing, till the meal is reduced to a structureless chyme, in which the proteins have been broken down into simpler constituents. Only when this stage has been reached does the pylorus relax and allow jets of chyme to enter the duodenum.

Three types of secreting glands can be distinguished in the mucous membrane of the stomach—the cardiac, the fundus or principal glands, and the pyloric glands. These last are of particular interest, to physiologist and surgeon alike. They possess one kind of cell only, with pale, clear, faintly reticulated protoplasm and a nucleus situated against the basement membrane. Those glands which lie proximally are simple tubes. Nearer the pylorus they become more convoluted and extend more deeply into the mucous membrane. At the pylorus itself they are larger still, and are continued into the submucous tissue. Beyond the pylorus we find the glands of Brunner, whose secreting tubules, highly convoluted, lie deep to the muscularis mucosae, only the duct passing through the mucous coat. *The cells of Brunner's glands are indistinguishable from those of the pyloric glands, and, taking into account not only this similarity and the gradual transition in shape and depths, but certain experimental work to be mentioned later, it may be accepted as a working hypothesis*

that the two systems are identical in function. The racemose glands which occur at the cardia are almost certainly of the same nature.

The distribution of these three gland systems varies in different animals, and especially does this refer to the pyloric Brunner glands. In the pig the cardiac glands extend over the whole of the fundus, and nearly half way down the lesser curve. The principal glands occupy a triangular area of the body which does not reach its upper border. The pyloric glands line the antrum and the lower half of the lesser curve, meeting the cardiac group. Brunner's glands extend 12 inches down the duodenum, but thereafter scattered representatives are found in the submucous coat of the first 10 or 12 feet of the small intestine. In man the cardiac glands occupy a very narrow strip near the cardiac opening, and the whole fundus and body are lined by principal glands. The pyloric system takes an area $2\frac{1}{2}$ to 3 inches wide proximal to the pylorus, which extends further along the lesser curve. Brunner's glands lie from the pylorus to the bile papilla, they may extend a variable distance further, but they never have the wide distribution found in the pig.

For our present purpose we must neglect many of the enzymes secreted in the stomach, and limit our consideration to two groups—the proteolytic substances, pepsin and hydrochloric acid, and the secretions of the pyloric Brunner glands. It has been accepted for many years that the production of acid and pepsin is the work of the fundus glands, and, though there may be some doubt as to the part played by the parietal cells, the main thesis has not, as far as I know, been contradicted. The function of the pyloric glands has been investigated more recently by Babkin in Germany, and of Brunner's glands by Florey at Leeds. The material obtainable from both is similar in general characters, an abundant viscid fluid of soapy appearance and highly alkaline reaction. More recently Meulengracht, of Copenhagen, has proved that the anti anaemic factor of gastric juice (Castle's intrinsic factor) is produced in the same region. Haematopoiesis is governed by an essential principle, which is formed by the action of an enzyme in the gastric juice on certain components in the food, absorbed from the intestines, and stored in the liver and to a lesser extent in the kidneys and brain. Pernicious anaemia

appears to be due to the loss of this intrinsic factor, it may be cured by the administration of the essential principle in the form of liver extract, or of the intrinsic factor in preparations of gastric mucosa. Meulengracht has shown that extracts of pyloric or duodenal mucosa are far more active than those of whole stomach, while extracts from the fundus gland region are without any anti-anaemic effect.

The mechanism of gastric secretion has been investigated in the main with regard to the flow of pepsin and hydrochloric acid. Pavlov's classical researches have shown that nervous factors are important. The sight, smell, even the thought of food, will provide an abundant flow of gastric juice. In dogs trained to answer the call of a bell to meals, the ringing of the bell alone will start this psychic secretion. Further, it has been shown by Edkins and many others that substances such as peptone and various meat extracts, acting on the mucous membrane of the pyloric antrum, produce a hormone which leads to a further flow of gastric juice. This hormone, named gastrin, is chiefly found in the antrum, but it has been demonstrated in smaller quantities in the duodenum and even the jejunum. The secondary, or chemically induced flow of juice, occurs in an isolated pouch of stomach transplanted to the mammary region. The mechanism governing the secretion of pyloric and duodenal juice, and of the intrinsic factor, is uncertain, but we know that it is independent of the action of food or food derivatives on the mucous membrane of the region of production.

This bare outline of the functions of the stomach in health suggests the foundation on which we must base the surgical treatment of ulcer. We do not know the cause of ulcers, when we do, operations will no longer be required for their cure. But we do know that they occur only in the presence of free hydrochloric acid, that they are common where acid is high, and unknown where it is congenitally absent or lost through disease, that in the normal alimentary canal they are confined to the segment exposed to the action of unneutralized acid, that is, between the cardia and the bile papilla, but that they may be found in any part of the intestine which, by operation, experimental anastomosis, or aberrant oxyntic tissue, is brought in contact with acid. The primary cause may be excessive acid production,

or failure in the mechanisms which protect the mucous membrane against acid. That ulcers are commonly found, not over the area of the fundus glands but that of the alkali secreting pyloro-duodenal segment, suggests that the second explanation may be the correct one. But whatever their origin, to cure ulcers we must not only remove them, but permanently lower the production of hydrochloric acid. Of the two requirements the second is the more important, for, if the cause of ulcer is removed, any ulcer remaining will probably heal.

When we consider the great number of operations that have been designed and performed for the cure of ulcer in the light of these considerations, we must reject many as unsound. Simple resection removes the ulcer but not its cause, the symptom and *not the disease*. The *short-circuiting operations* aim at reducing acidity by favouring regurgitation of alkaline fluids into the stomach, but in fact they do not do so, as is proved by test meals repeated some months after operation. Acid production is not diminished, for the nerves commanding psychic secretion and the mucous membrane producing the hormone which calls up after-secretion remain, and the acid secreting surface is untouched. *Admixture of intestinal and gastric contents* is possible, but it does not occur to any useful extent because high acidity is always associated with high gastric tone, so that the stomach contents are rapidly expelled through the new opening. A short circuit will cause a duodenal ulcer to heal by deviating the acid from the site of ulceration to a new one, but it only transfers the factors which caused that ulcer to a new part of the intestine, undesigned to combat them and unprotected by any sphincter. *Gastro-duodenostomy* is theoretically better than *gastro-jejunostomy*, because the new surface exposed to the acid has the protective secretion of Brunner's glands, but this mechanism having failed once, can hardly be relied upon to succeed later. Even more unsound are the plastic operations upon the pylorus, which attempt to treat the ulcer by overcoming the spasm which accompanies it, but *pyloric spasm is not causing the ulcer*, but rather attempting to heal it.

The operations which include resection of part of the stomach are more radical, in the sense that they go to the root of the trouble. I would ask you to banish from your minds the instinc-

tive notion that gastrectomy is more destructive than a short circuit. Any operation which abolishes the action of the pylorus also abolishes that trituration and gradual liberation of the food mass which we understand by gastric digestion, and is therefore destructive. We must often destroy to make well, but if we destroy without improvement, we mutilate.

At this point in the original lecture I propounded the operation that I called 'Physiological gastrectomy' in the following paragraphs

'It cannot, however, be said that all, or even many, of the resection operations are either soundly planned or successful. I would select for especial condemnation those limited gastrectomies which pass under the name of pylorotomy. These, with the topographical excuse of excising the ulcer bearing area, remove all the alkaline without reducing the acid secreting surface. The further the plane of resection extends to the left, the more absolute is the reduction of acid. In this respect the Polya type of operation is preferable to the Billroth I. and the Schoemaker, which attract the eye because they leave a *mimic* stomach emptying through a counterfeit pylorus. But all these standard operations sacrifice a large proportion of the total alkaline secretions, and involve the subsequent risk of anaemia. That anaemia may follow gastrectomy has been known for years, now that the intrinsic factor has been traced to the pyloric glands, it becomes a matter for surprise how few cases show this complication. The explanation is to be found in the variable lower boundary of the Brunner's gland zone. If the duodenum is divided low in an individual whose Brunner's glands stop at the bile papilla anaemia will follow, but the same operation will be harmless in one whose alkali glands extend some distance below it.

Reference to the facts of gastric secretion and the aetiology of ulcer show, however, that the removal of the pyloric antrum is both unnecessary and unwise. It is unnecessary because this segment secretes no acid, and produces the acid hormone only when it is bathed in the products of digestion. It is unwise, because maximum alkali conservation is the surest protection against recurrent ulceration, and because retention of the whole haematopoietic secretion is the only safeguard against anaemia. Distal section of the stomach $2\frac{1}{2}$ inches proximal to the pylorus, preserves these secretions yet abolishes production of the unwanted hormone. This recent modification is not only physiologically sounder, but it makes gastrectomy a much easier and shorter and therefore a safer operation. To reduce acid production, the greater

part of the body of the stomach should be removed, and the line of the proximal section should pass high on the lesser curve, where the branches of the vagus ramify before they enter the stomach. The acid is thus lowered by three means: by removing a considerable portion of the surface which secretes it, by dividing the nerves which stimulate psychic secretion, and by suppressing the hormone which induces after secretion.

'Finality is not yet in sight, but the operation which I put before you as physiological gastrectomy, satisfies more than any other practised to-day the needs of cure and the demands of function. The stomach is divided about $2\frac{1}{2}$ inches proximal to the pylorus, and the distal end is closed, so that the alkaline and haematopoietic secretions pass on through the pylorus to the duodenum. The lesser omentum is divided close to the cardia, the greater at a point just below the spleen. The stomach is cut across an inch below these two points, and the cut surface is closed in its upper two-thirds. A loop of jejunum is then brought up through an opening in the transverse mesocolon to the left of the middle colic artery, and is sutured to the cut surface of the stomach, the proximal end near the cardia, the distal at the greater curve. A stoma, about $1\frac{1}{2}$ inches long, is made between the jejunum and the open lower third of the cut surface of the stomach.

'Here we have a strange and alien digestive system, to replace one that has failed. Yet, I think you will agree that it passes the physiological test more creditably than others. Normally acid digestion takes place in the stomach, and food enters the duodenum where it meets the alkaline flow of two glands at the bile papilla. Acid damage to the intestine is prevented by the action of the pylorus. In physiological gastrectomy we have constructed a new alkaline gland consisting of liver, pancreas, and pylorus: the duodenum becomes a duct representing an elongated ampulla of Vater, and it pours its alkaline tide on the gastric efflux at the stoma. Food can only pass onwards, for the new opening is at the lowest part of the new stomach and is separated from the alkaline channel by an efficient valve. Gastric digestion is preserved by the small stoma. Acid damage is prevented by greatly reduced acidity, and fully retained alkaline secretions.

'To convince you that physiological gastrectomy really does reduce gastric acidity, I asked twelve old patients, on whom the operation had been done, to submit to a further test meal. You will see that the acid in these twelve patients has been reduced to a level at which fresh ulceration cannot possibly occur, and also that the meal has remained in the stomach for $1\frac{1}{2}$ hours, long enough to allow a reasonable amount of gastric digestion to take place.'

This operation proved one of the major disasters of surgery. For this reason, though this volume is not concerned with surgical technique, I am including my original thesis with the faulty reasoning on which it was based, adding the first of the many apologies by which I have tried to warn others to avoid it.

DISADVANTAGES OF 'PHYSIOLOGICAL GASTRECTOMY'

(*Lancet*, 1938, II, p 295)

'Some two years ago I advocated radical removal of the body of the stomach combined with the preservation of the pyloric segment, and called this operation "physiological gastrectomy" in the belief that by combining extensive reduction of acid production with maximum alkali conservation and retention of the haematopoietic factor, it dealt effectively and permanently with the causes of ulceration, and avoided the anaemia that occasionally followed standard operations. I wish to state now with wider knowledge that exclusion operations of this type should at all costs be avoided.

'When I published my paper in the *Edinburgh Medical Journal* I had had no reason in two years' trial to be anything but satisfied with the results of this procedure. Since then 9 out of 22 patients in whom "physiological gastrectomy" had been performed more than two years ago have been found on follow up to have pain, 3 lost their symptoms after medical treatment, but 6 had definite jejunal ulcers requiring further operation. Of these 6 jejunal ulcers 3 were in a series of 12 gastrectomies for duodenal ulcer, and 3 were among 10 patients previously operated on for jejunal ulcer following gastro-jejunostomy.

'These unfortunate results are in marked contrast to about 100 gastrectomies in which the duodenum was divided, some of them under observation for twelve years, among whom no cases of recurrent ulceration, or indeed of more than minor discomfort, have been met.

'Gastrin has been found in experiment only when the products of food and digestion are allowed to come in contact with the pyloric mucous membrane, it should not be produced in a pyloric segment permanently excluded from the food channel. But the patients who have been reinvestigated some time after "physiological gastrectomy" have all had a high acid curve, in marked contrast to the low figure seen after resection of the usual type, an observation suggesting that, in many at any rate, a secretory hormone may be manufactured in the pylorus in response to stimuli other than food, such as muscular

contractions or the regurgitation of bile from the duodenum. This chemically induced flow of acid is much more dangerous than the psychic one, the latter is poured on to food, the former on to an empty stoma.'

In the present state of surgical knowledge a high gastrectomy, which removes eighty per cent of the acid secreting surface of the stomach, including all the part that contains the deepest fundal glands, which divides the greater part of the vagal fibres where they lie bunched in the upper part of the lesser curve, and which removes the source of the gastric hormone, is the most certain method of reducing the acid secretion permanently below the danger level without abolishing gastric digestion altogether

I am afraid that I have not brought anything new, or given you any information that will help you to pass your examinations. But if you regard your problems as you meet them in the way I have tried to suggest, if your treatment is not merely the routine you have learned, but is based upon sure principles and directed to attain a definite object, you will at any rate find an added interest in the profession which you have wisely chosen for your life's work

15 THE PHYSIOLOGICAL BASIS OF OPERATIONS FOR PEPTIC ULCER

(From 'A Hundred Years of Gastric Surgery', *Annals of the Royal College of Surgeons of England*, Vol I, No 1, July 1947)

IN the early days of gastric surgery, when anaesthesia, instruments, materials, theatre technique, and pre- and post-operative methods were all crude according to modern standards, the choice of operation was dictated, above all, by consideration of the patient's safety. For cancer, gastrectomy, growing more and more radical as technique improved, was, from the first, the recognized treatment. For ulcer, a distressing but not a mortal malady, the attempt to find an operation that would give permanent relief at small risk led to the adoption of a number of procedures which varied as views on the aetiology of ulceration changed. At first, the operation of gastro jejunostomy held pride of place. It was simpler and safer than gastrectomy, and, after the first difficulties had been overcome, it was eminently satisfactory. The posterior operation became the rule, and, with the adoption of the no-loop or short loop type of anastomosis, the mechanical obstruction which was a common sequel of the first operations was avoided. The operation was originally performed for cancer and for duodenal ulceration with pyloric stenosis, but, so excellent were the results, that it came later to be applied to the treatment of all ulcers, even those with no stenosis or even delay. Failures appeared, but at first they were few. In 1899 Braun described a postoperative jejunal ulcer. In 1905 Mayo Robson wrote a paper on gastro jejunal ulceration, but looked upon it as a rare complication. With the increase in gastric surgery however, and particularly with the application of gastro-enterostomy to the treatment of earlier ulcers in younger patients, stomal ulceration became a problem to be reckoned with. Surgeons first sought for the explanation in some technical error, in the use of clamps or unabsorbable sutures or in the site or size of the opening, but they came to realize that the fault lay rather in performing the operation at all in patients with high acid and

rapid emptying. Gastro-jejunostomy had its heyday from 1900 to 1925. In the early twenties doubts of its efficacy began to

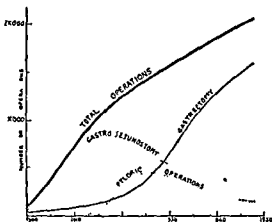


FIG. 2 —Trends of ulcer surgery over fifty years.

appear, and a group of operations round the pylorus, gastro-duodenostomy, pyloroplasty, Finney's operation, and other variations of gastro-duodena lanastomosis, were introduced to overcome pyloric stenosis or spasm and promote early neutralization of the gastric contents.

These operations, in turn, shared the fate of gastro jejunostomy. They proved to be less successful than their authors had hoped, and no more immune than the older operation from recurrent ulceration and from the late twenties the operation of partial gastrectomy has assumed increasing importance in the treatment of gastric and duodenal ulceration.

One reason for the abandoning of short-circuiting operations was the demonstration that the neutralization they achieved was illusory, and that the acid level, which showed an apparent drop in the immediate postoperative phase, returned a year later to its preoperative level, or higher. Others were the increasing safety of the larger operation in practised hands, and the permanent acid reduction achieved by adequate resections. Partial gastrectomy, like gastro-jejunostomy, went through a period of intensive testing, during which the unsatisfactory methods were eliminated and the satisfactory ones improved. It has eventually emerged as a safe and satisfactory, though by no means stan-

dardized, procedure, that in average hands still has a high mortality, but that in the hands of the expert carries no greater risk than the older operations, and a far higher prospect of cure. For the past ten years a radical gastrectomy, that differs in design in different clinics but in all carries out certain basic principles, has been the accepted treatment for peptic ulceration among the great majority of gastric surgeons throughout the world. In experienced hands it has a mortality not exceeding 2 per cent, a cure rate of at least 90 per cent, and an incidence of recurrent ulceration of at most 1 per cent. Yet, because in average clinics the risks of gastrectomy are four or five times as high, and the prospects of cure less assured, alternative treatments are constantly sought. Where do we stand to-day?

The literature dealing with the aetiology of ulceration is not merely overwhelming, it is self-cancelling. Whatever we wish to believe, we can find evidence in experimental work to prove our theory. Ulcers have been produced by dividing the vagi and cured by dividing the vagi, they have been produced by ligating the gastric vessels and cured by the same means, they have been produced by transplanting patches of jejunum to the stomach wall and cured by jejunal transplants. Nervous impulses, trauma, toxins, infection, irritants, malnutrition, vitamin deficiency, have all been implicated. Clinically, family disposition, oral sepsis, and acute infections all seem to play a part. The one factor on which there is unanimity is that of acid. Peptic ulcers occur only when and where there is hydrochloric acid, they are common where it is high, rare where it is low, unknown where it is absent. Yet, though acid is associated with ulcer, it is not the cause. Most healthy men and women in the prime of life have a high acid level, but very few have ulcer. In their moments of supreme fitness their acid is highest and their chances of ulceration lowest.

On other surfaces, such as the skin or the mucous lining of the mouth, we do not search for one cause of all lesions. Spots on the skin may be due to chemical irritants, thermal or mechanical injury, drugs, local or general infection, specific fevers. These spots usually heal and leave no trace behind them, but if they occurred on a surface exposed to digestion they would persist and assume a uniform pattern.

An automobile may break down for many reasons. A tyre

may go flat, a wheel may come off, a bolt may drop from the steering or transmission, a break may appear in the ignition system, a fly may choke a jet, or a drop of water may block a petrol pipe. The machine stops, the cause of failure is discovered and corrected, and then it goes on again. The mechanism of an aeroplane may go wrong for similar reasons, but in this case the result is usually permanent and usually the same—a mass of crumpled aluminium. We do not, however, try to prove a common cause. The causes are as varied as those that stop an automobile, but a secondary factor, that of gravity, comes in to make what is a temporary breakdown in the first case, a permanent disaster in the second.

It is probable, then, that the causes of ulcer are as many and varied as the causes of skin spots and automobile breakdowns, but while lesions on the skin and mucous membranes are allowed to heal, those on a surface exposed to acid are digested away and become chronic ulcers, similar in each case whatever their first cause. The common sites of ulcer are not those where the primary lesion occurs most often, but those where the fixity of the part opposes healing and favours auto-digestion. But whether acid be the cause of ulcers or only the cause of their persistence, the surgical treatment of ulcer is bound up with a reduction in the acid level.

Many methods of reducing the acid level have been advocated, but four in particular, the short circuiting operations, vasoligation, vagal section, and gastrectomy, must be considered in relation to the mechanism of acid secretion which they are intended to modify.

Acid and pepsin are secreted by the principal glands of the stomach which in man occupy the whole body and fundus, in fact all of the stomach except for two areas, a small strip near the cardia and the pyloric antrum, which bear the cardiac and pyloric glands respectively. But the secretion potential is not equal throughout this acid bearing area. In the body the mucous membrane is thick and rugose, carrying deep glands and thrown into numerous tall folds which increase its secreting surface very greatly, in the fundus it is smooth, thin, and carries simpler and shorter glands. This secreting surface pours out acid in response to stimuli of two kinds, nervous and hormonal. Secreto-motor

impulses are transmitted by the vagi and are called forth by the anticipation, sight or smell of food, and by the pleasure in eating

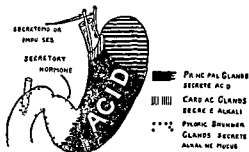


FIG 3—Secretory areas of the stomach

which man experiences in the early stages of a meal and the dog at all times, they are abolished by vagal section. The hormone which evokes acid secretion is formed in the mucous membrane of the pyloric antrum, and to a much lesser extent in that of the duodenum and upper jejunum, in the presence of the products of gastric digestion, such as peptone. The hormonically induced flow of acid remains after vagal section.

The purpose of this double mechanism is clear. Gastric digestion is a prolonged process whose main task is to release meat fibres from their connective tissue envelope and reduce their proteins to simpler fractions. Meat meals, to the animal and to man in natural surroundings, come suddenly and unexpectedly, and some rapid mechanism for preparing a digestive medium into which they shall be received is essential. But when hunger is sated gastric digestion is by no means finished, and the hormone provides a slow and automatically regulated mechanism for keeping up the flow of digestive juice as long as there is anything in the stomach to digest.

The relative part played by these two mechanisms in man is unsettled. Most experiments on gastric digestion have been done on the dog, an animal that eats seldom, but with indecent haste and unconcealed joy. These experiments have led to an undue emphasis on the vagal mechanism in gastric secretion. Man eats from habit rather than hunger, and in decent society he takes about half an hour to get through a meal, but he retains the meal

in his stomach for a further two hours, during the whole of which he is renewing the acid bath in which digestion is taking place. It is therefore reasonable to suppose that in the human stomach the hormonal mechanism exceeds in importance the nervous one, and equally reasonable to suggest that the ulcer diathesis is characterized by hormonal misdeemeanour rather than by vagal over action. The ulcer patient is distinguished, less by his high acid level than by his habit of secreting acid at all times, not only when he is eating but between meals and when he is asleep.

The acid curve of the usual fractional test meal shows two humps like the Bactrian camel, a characteristic contour that is usually accepted without comment. It may be suggested, not as a statement of fact but as a hypothesis to excite controversy, that the first hump represents the vagal secretion called forth by the meal, the second the late hormonal secretion and the valley between them, the change-over period after the meal is finished and before the after flow has got into its stride. With this outline of the mechanism of gastric secretion in mind, we may examine the four groups of operations advocated for the cure of peptic ulceration.

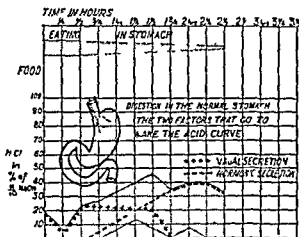


FIG. 4

The short circuiting operations do nothing to reduce the acid production, but leave unaffected the acid beating mucous surfaces and the nervous and hormonal influences which cause them to

useful weapon for eliminating pockets of stubborn resistance. Those incurably ulcer prone patients, whose ulcers recur even after the most radical resections skilfully performed, will have cause to bless the name of Dragstedt

To bring back an old star for an encore while her rival holds the stage is a task as thankless as criticizing the new favourite. Nevertheless, we must ask ourselves if we have, in fact, any alternative treatment for ulceration that can rival radical gastrectomy in the satisfactory nature and permanence of its results. The word 'radical' is used advisedly, for gastric resection may mean anything from pyloric circumcision to a planned and effective removal. The requirements of radical gastrectomy are threefold. First, it must remove the whole of the high

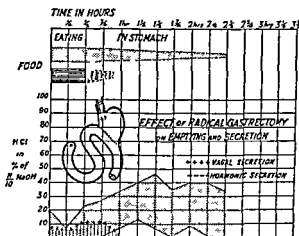


FIG 7

thin mucous membrane of the body and leave only the layer of the fundus, that is, it must Secondly, it must remove

of Travancore, and is unique in that it is designed to reduce radically the ability of the gastric membrane to secrete acid while

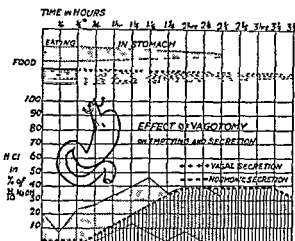


FIG 6

leaving the shape and nerve supply of the stomach intact. In theory it seems unlikely that secretion can be abolished by such means without, at the same time, harming the neuro muscular mechanism, and in practice the operation has not been sufficiently successful to persuade those most competent to judge, the colleagues of the authors in Lancashire and India, to adopt it.

Vagal section has a more scientific basis, since all experimental work has emphasized the importance of the nervous mechanism in gastric secretion. Dragstedt's pioneer work on dogs, and the strikingly successful results which he and the many surgeons who have followed him have obtained in treating human beings

secrete. They were designed to bring about neutralization of the acid gastric contents by allowing alkaline juices to enter the

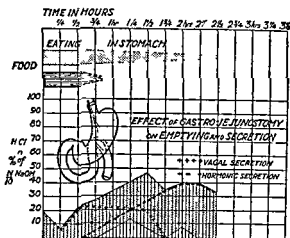


FIG 5

stomach, a mechanism that was thought to be the normal one. It is, however, doubtful if any part of the alimentary tract works backwards except in the cow, on the contrary each segment does its allotted job in the digestive process, and hands the result along the production band to the next department. The stomach, having reduced the meal to chyme, pushes it on to the duodenum and shuts down secretion till the next meal. Bile seldom appears in the normal stomach, and still more rarely in the hypertonic and rapidly emptying stomach of the duodenal ulcer patient, either before or after gastro jejunostomy. The constant result of gastro-enteric anastomosis is that food leaves the stomach shortly after it has been eaten, so that the second wave of acid when it comes is poured on to a mucous membrane unprotected by food. The unsatisfactory results of short-circuiting operations when performed on patients whose acid mechanism survives, or is capable of survival, are by now notorious.

Vaso ligation has enjoyed a certain vogue in Britain. The operation consists in ligating so many of the gastric vessels that the blood supply of the stomach is reduced to a point just short of gangrene. It was propounded ten years ago by Wilson Hey, of Manchester, and has lately been advocated by Somervell,

of Travancore, and is unique in that it is designed to reduce radically the ability of the gastric membrane to secrete acid while

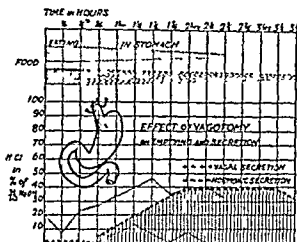


FIG 6

leaving the shape and nerve supply of the stomach intact. In theory it seems unlikely that secretion can be abolished by such means without, at the same time, harming the neuro-muscular mechanism, and in practice the operation has not been sufficiently successful to persuade those most competent to judge, the colleagues of the authors in Lancashire and India, to adopt it.

Vagal section has a more scientific basis, since all experimental work has emphasized the importance of the nervous mechanism in gastric secretion. Dragstedt's pioneer work on dogs, and the strikingly successful results which he and the many surgeons who have followed him have obtained in treating human beings suffering from peptic ulceration, have placed the operation of supra-diaphragmatic vagotomy in the forefront of contemporary interest. It is odious to criticize the darling of the moment, whether in films, sport or surgical technique, but it would be well, before we rush into the operation wholesale, to ask whether it has drawbacks as well as advantages, whether it is, indeed, the answer to the gastric surgeon's prayer. Vagotomy diminishes very profoundly the quantity and acid level of gastric secretion in so far as that secretion follows nervous stimuli.

It does not reduce the glandular basis of acid production, it does not affect the hormonal mechanism of after-secretion, it does not remove the deformity or the fixation to surrounding structures which are the causes of many of the effects of ulceration, and it has a tendency to delay emptying and promote distension. It may be, therefore, that vagotomy will eventually assume a place akin to that of the flame-throwing tank in modern warfare, a useful weapon for eliminating pockets of stubborn resistance. Those incurably ulcer-prone patients, whose ulcers recur even after the most radical resections skilfully performed, will have cause to bless the name of Dragstedt.

To bring back an old star for an encore while her rival holds the stage is a task as thankless as criticizing the new favourite. Nevertheless, we must ask ourselves if we have, in fact, any alternative treatment for ulceration that can rival radical gastrectomy in the satisfactory nature and permanence of its results. The word 'radical' is used advisedly, for gastric resection may mean anything from pyloric circumcision to a planned and effective removal. The requirements of radical gastrectomy are threefold. First, it must remove the whole of the high

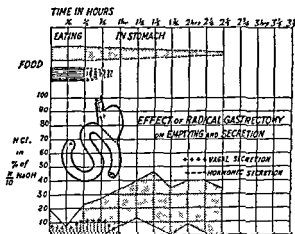


FIG 7

convoluted mucous membrane of the body and leave only the thin low-secreting layer of the fundus, that is, it must take three-quarters of the stomach. Secondly, it must remove the whole of

the antrum or antral mucous membrane as far as the pylorus, so that no further acid shall be secreted when the food has left the small stomach, as it will do in about twenty minutes. Thirdly, it must divide the soft tissues on the lesser curve as far as the cardia, and so cut off more than half the vagal supply.

A gastrectomy so performed reduces the acid secretion profoundly and permanently, and limits its outflow to the time that food is in the stomach. It gives results that are uniformly excellent, and still remains the standard by which other operations are judged.

16. SURGICAL HANDICRAFT¹

(*The Lancet*, 1947, p. 545)

SURGERY began as a handicraft. In ancient times it was conducted by journeymen who plied their simple trade, often coupled with that of the barber, at fairs and inns. Gradually, through the vision and by the labours of a series of guilds and corporations to which this College stands in direct succession, it was elevated from a humble craft to a science and an art. Within the last few years British surgery has attained a level higher than it has ever reached before; we have hitched our wagon to a star; let us see that the wheels are well planted on the road.

I speak of the craft of surgery, for the word craft retains unsullied its honourable tradition of sound work well done, whereas the word 'art' is dragged down under the weight of those who claim its appellation. The hairdresser, the crooner, the juggler, the Hollywood extra, are all artists, whereas the watchmaker, the plumber, the smith, the carpenter, and the shipwright are proud to remain craftsmen. A surgeon, like a shipwright, must consider the design and purpose of the task he is about to undertake, his materials, his tools, the arrangement of his workshop, and the training of his assistants. His aim is the same, to please the customer.

The tasks we undertake in surgery are five:

1. We incise, to gain access to all deep regions, to drain abscesses, to remove stones, and to provide an outlet to the surface.
2. We excise tumours and dead or unhealthy tissue.
3. We repair damage, we stop haemorrhage, close perforations, approximate fractures, suture tears, and close the incisions we ourselves have made.
4. We remodel, to restore form on the surface of the body, or function in its deeper structures.
5. We transplant, to substitute what we may for that which has been lost.

¹ Bradshaw Lecture delivered at the Royal College of Surgeons on November 14, 1946

The tissues that are the material of our craft are for the most part skin, fat, connective tissue, muscle, and bone

SKIN

Skin is the ensheathing coat, the doorway to the rest of the body. A wound is not healed till the skin is healed, nor is its

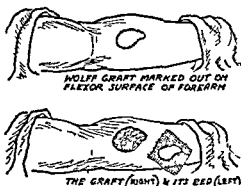


FIG 8—Shrinkage of graft when excised

sterility secure till the skin cover is complete. Skin consists of a tough felting of connective tissue with an epithelial cover. It possesses a considerable amount of elasticity, but this elasticity varies from place to place, according to the functional needs of the part.

The elasticity of the skin is a necessary quality in the external envelope of a body that grows, moves, and constantly alters the position and contour of its component parts. A cut in the skin tends to gape. An excised Wolff graft is smaller, and the hole left behind is larger, than the pattern originally marked on the surface (Figure 8). The elasticity varies from place to place according to the functional needs of the part. Over the abdomen it is well marked, to allow room for the constantly recurring *expansion of respiratory movement, the frequent distension of meals, and the occasional encroachment of babies*, over the back it need not, and therefore does not, stretch to any great extent. The elasticity is graded not merely to the extent but also to the direction of the stresses. Over parts that move, the skin must be able to stretch during extension and take up the slack during

flexion, to twist during rotation, and always to return to the position of rest, which for any part of the body is usually that assumed in sleep

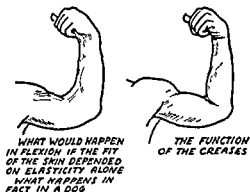


FIG 9—Function of creases

But elasticity alone could not adapt the skin to the flexure surface of a hinge joint, where the tendency to shorten would make it bridge the angle during flexion and come away from the surface. This tendency is counteracted by the flexure creases which appear in the skin at all joints (Figure 9). As Wood Jones has pointed out, these creases are planes of stasis where the skin is anchored by a web of fibrous tissue that extends through the fatty layer to the deep fascia.

Incisions The first step in any surgical operation is an incision through the skin, and the last step is suture of the skin so that the least possible trace of the operation in altered function or visible scar remains. The patient will judge the success of the operation by the appearance of the scar rather than by what has been done beneath it.

An incision must give access for the operation that is to be performed, but, in planning it, the functions and movements of the skin in that part and the need to suture it exactly as it lay before must be borne in mind. In general, incisions should be

made across lines of tension, particularly over the flexures of joints, where the movement, the elasticity to accommodate it, and therefore inherent tension are always greatest—i.e. in places

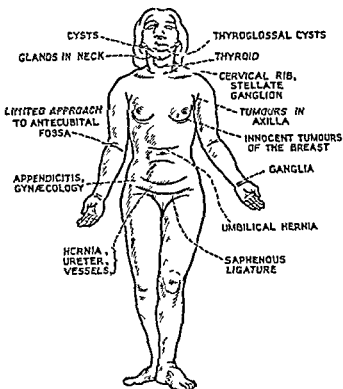


FIG 10—Incisions

like the front of the neck and the lower half of the abdominal wall (Figure 10). By cutting across lines of tension the elasticity of the skin in that line is interfered with only by the width of the inextensible scar, which with first intention healing is measured in fractions of a millimetre, rather than by its length, which always extends in inches. What is functionally desirable may not always be anatomically possible. Transverse incisions over Scarpa's triangle are excellent for any approach to the vessels, but of little value as an approach to the underlying hip-joint. Transverse incisions over the distal joints of the limbs are limited in length by the need to avoid the sensory nerves and surface veins that run

longitudinally, and are suitable for small and superficial operations only. Where possible an incision should be made in a natural

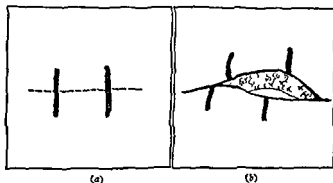


FIG 11—Method of obtaining correct apposition of skin in suturing (a) lines marked with dye before incision, (b) distortion of skin after incision

crease, for only where a surgical scar corresponds to a physiological one can it achieve perfection—perfect invisibility and function perfectly restored.

The incision having been planned, care must be taken before making it to ensure that when sutured the two edges shall lie exactly as before. The elastic skin over any part tends to return to the position of rest, which is not necessarily the extended and supine position of a patient on the operating table, and, when cut, the two edges may take independent directions (Figure 11). To ensure that they are brought together by suture as they lay before incision, they must be marked by lines drawn across the site of the cut before it is made. These marks are usually made by scratches, an effective method but a crude one, for the scratches often show permanently, and being in tension lines occasionally become keloid. They should be made with a dye such as Bonney's blue, drawn in bold strokes across the skin with a poster nib.

Sutures. In suturing, the superficial fascia as well as the skin should be brought together accurately with a tension that keeps them in apposition but does not interfere with their blood supply. The same stitch cannot bring the deeper layers together as well as the superficial unless it embraces them in a wide sweep, when it will be too far from the skin edge to secure exact epithelial apposition (Figure 12a). Methods that appose the skin edges

exactly, particularly Michel's clips, leave spaces in the subcutaneous layers in which infection may appear, and which, in

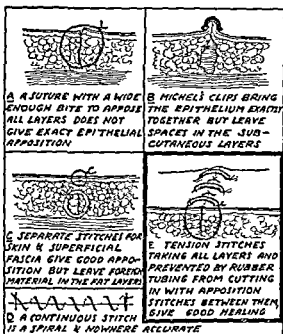


FIG 12—Sutures

any case, leave a broad band of scar tissue in the deeper layers (Figure 12b) The use of separate suture for the subcutaneous and cutaneous layers is undesirable, for fat resents buried foreign material (Figure 12c) A continuous suture is easy and rapid, but it is not accurate anywhere unless it is a blanket stitch, for the material is inserted as a spiral whose coils are nowhere opposite each other, and tightening approximates the ends of the incision, not its edges (Figure 12d) The best method is probably to insert a series of tension stitches at intervals of about an inch, including all layers and piercing the skin about half an inch from the incision, and to approximate the skin by other stitches between these (Figure 12e)

Skin cannot be sterilized except temporarily and on its surface Stitches passed through its thickness traverse the deeper layers, where sweat and sebaceous glands harbour resident organisms,

and form a track along which these organisms may spread. Infection along a stitch track is largely mechanical. Suture materials with a mesh—e g silk, linen, and cotton—form a wick that absorbs tissue fluids, giving not merely a path to bacteria but also food for their journey. A thick strand makes a larger hole and is likely to perforate more glands and allow more bacteria through than is a fine one. The impervious monofilament suture materials are in theory best, and in practice they seem to give healing with least reaction and to leave no stitch marks if they are removed early. The favourites of the moment, nylon and steel wire, both have disadvantages: nylon is not very strong, and will not tie securely with a single reef knot, and steel wire can only with difficulty be prevented from kinking. Fine selected silkworm gut is hard to beat.

FAT

Fat in the body has three main purposes. First, it is a heat insulator. Man is almost unique among land mammals in using fat for this purpose. Others, indeed all warm blooded creatures who live in the air, use the non conducting properties of air for heat protection by trapping a layer of it round their bodies in fur or feathers, and by varying the thickness of the layer to suit the needs of the moment. The human being who loses his fat loses his human appearance. The very old man or the starved child looks like a monkey.

Secondly, fat is a store of fuel to be drawn on when food is lacking.

Thirdly, fat, combining the displaceable qualities of a fluid with the permanence of a solid, is used as cushioning material, to bear weight, as over the heel and the tuber ischi, to allow structures to move or change their shape in a confined and rigid space, and to protect vessels and nerves exposed to sudden angulation near a joint.

Fat has a scanty blood supply, and therefore a poor resistance to trauma and infection. It must be treated gently, cut cleanly, not torn or undermined. The fatty layers of a wound should be drained under conditions of contamination in which more vascular tissues could be trusted. Fat is on the whole the enemy of surgical handicraft. It tends to alternate with connective

tissue in the interspaces of the body, such as the subcutaneous layers and the mesenteries. Where there is little fat there is much fibrous tissue and stitches hold well, where there is much fat blood vessels have hardly any adventitious sheath, and tear easily or slip out of ligatures, and stitches tend to cut out.

CONNECTIVE TISSUE

Connective tissue is the framework of the body, the limiting agent that draws a boundary line between one structure and the next, the clothing agent that furnishes the uniform in which each organ serves, the strengthening agent that gives the necessary toughness to more specialized tissues. It provides the sheaths of muscles, nerves, and blood vessels, the capsules and ligaments of joints, the envelopes of glands, the aponeuroses and tendons of muscles. It gives toughness to epithelial mucous and serous coverings and linings, whose surface cells give the special properties of lubrication, secretion, and resistance to infection. It is the only structure that holds stitches. Where there is no connective tissue, as in the brain, suture is impossible, where there is little, as in the liver and kidney, it is difficult. Connective tissue is a simple structure needing very little blood supply. For this reason it is very viable and can be transplanted. For the same reason it has a low resistance to infection, but, since it usually occurs in thin sheets accompanying more vascular structures, it does not slough like fat. When infected it may take many months to sequestrate.

The properties of connective tissue as the basic material of surgical handicraft vary with its site and function. The derma is a felt work, equally strong in all directions. It can and does stretch, and is therefore unsuitable for transplants where strength is desired. Tendons and aponeuroses consist of parallel fibres laid down in the line of strain and are strong in the line of their fibres, but easily torn across it. The posterior rectus sheath and Poupart's ligament are examples of connective tissue structures constantly encountered by the surgeon that are strong in one direction only. To obtain adequate access, the posterior rectus sheath must usually be divided across its fibres, and the cut edges therefore offer very little hold to sutures, which tear out if there

is any tension (Figure 13a). Here a running mattress suture (where, instead of a single stitch pulling in the line of the fibres,

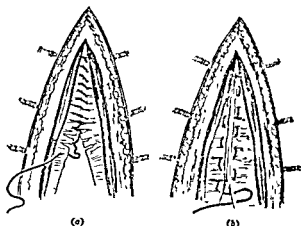


FIG. 13 —Suture of posterior rectus sheath: (a) over-and-over stitch; (b) running mattress stitch.

a loop holds a bunch of fibres securely and everts the peritoneum) is the one workmanlike method of approximation (Figure 13b). No surgeon would willingly cut across Poupart's ligament, but all must use it as the inferior anchorage of any reconstruction of the inguinal canal. For such work, living sutures, such as pedicled strips of external oblique, and transplanted strips of fascia lata, have the considerable disadvantage that their necessarily coarse calibre splits the ligament into a leash of separated fibres. For these reasons many surgeons prefer foreign suture material of finer calibre. Where aponeuroses are felted, as are the layers of the rectus sheath at the linea alba, stitches hold well. Scar tissue is usually felted and gives secure anchorage.

MUSCLE

Muscle, unlike skin, fat, and bone which are structural, is a functional tissue. Muscle which does not function because its nerve supply is cut dies as surely as if it is deprived of blood. Muscular tissue has an abundant blood supply on whose uninterrupted continuity its survival depends.

Free incisions into a muscle may lead to the death of a segment by cutting the vessels that supply that part; rough handling and

strangulation by sutures tightly tied may do the same. On the other hand, muscle with its free blood supply offers a high resistance to infection, and its cut surfaces heal rapidly if approximated without tension or strangulation. Septic conditions in the abdomen should therefore be approached by incisions through muscles rather than through fibrous planes. A colostomy should be brought out through muscle to avoid sepsis and fibrosis. Muscle cannot be transplanted as a free graft, but a strip whose blood supply is preserved may be swung as a pedicle graft to fill a cavity.

BONE

Bone is specialized connective tissue and has many of the same properties, the strength, the ability to hold fixing materials, the low blood supply, the poor resistance to infection, the transplantability. It differs in being rigid. It cannot be bent, and a bone surface can be approximated to another surface of bone or soft tissues only if the two are a mechanical fit. Its properties are partly those of hard wood, like oak or teak, partly those of stone or concrete. Long bones and young bones are more like wood, square bones and old bones like concrete.

OPERATING THEATRE

These, then, are our main materials, what of our workshop, the operating theatre? The design is a matter of functional needs, individual preference, and architectural fashion, but it must meet certain requirements. The air in the immediate neighbourhood of the wound must be sterile or at least free from pathogenic organisms, and the temperature must be warm enough to conserve the body heat of the patient, yet cool enough to allow the team to work without exhaustion. The lighting must be adequate and dirigible on the operating field from all points of the hemisphere above it.

The first essential in an operating block is that the theatre and its annexes must be accessible only to sterile materials and 'sterile' personnel, that is to the patient and the operating team. Spectators must be on another floor reached by another staircase or lift. This arrangement not only avoids unnecessary contamination of the air and furniture of the theatre, but also gives

better facilities for instruction. The spectators' gallery, sealed off from all air communication, can be brought right over the

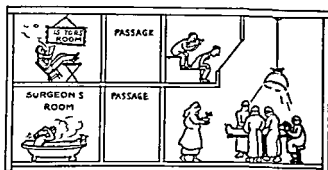


FIG 14.—Scheme for theatre and spectators.

operating table so that the visitor can look into the depth of the wound instead of over its edge, as he does when he stands beside the team, and with field glasses he can see detail as well as the surgeon can. In the near future television installed in the lamp assembly will allow any number of spectators to get the same view. The separate gallery does more than reserve the theatre for its proper purpose, it becomes part of an instruction floor where demonstrations and exhibitions can be arranged for visitors between operations.

The air on an upper floor, where theatres are usually built, is practically free from organisms. Air borne infection comes from dust, which in turn accumulates on projecting fittings and is distributed by air currents, and from droplet infection. Fittings, such as cupboards, stoves, and shelves, have disappeared from any modern theatre, and those that remain, such as X-ray viewing screens and electric fittings, can be flush with the walls. Many of the projections that accumulate dust, and many of the air currents that distribute it, are bound up with the lighting, ventilation, and warming of the theatre. Air-conditioning, serving at one time the needs of ventilation, temperature regulation, and air purification, solves most of these problems, since pipes and hot panels disappear and air currents are diminished and predictable. Whether windows should disappear is debatable, but they probably will. Daylight is inferior to a properly designed lamp, and it cannot be laid on or varied at will. A lighting system can

be exteriorized, and the only furniture that must remain in the theatre is the operating table, the anaesthetist's stool and apparatus and the instrument stands

In this workshop we do our tasks of incision, excision, repair, and reconstruction, and in doing them we must cut, pick up, hold, crush, fix, and join the tissues which are our materials. Special instruments are needed to cut, hold, and fix bone with its special properties, for the sake of brevity and simplicity we will leave these out and consider only the craft of soft tissue surgery. In this we use a knife to cut skin, and scissors to cut fascia or sutures, dissecting forceps to pick up, tissue forceps for a gentle hold, and haemostats for a firm one, Ochsners to hold or crush, and needles to sew. These are our basic tools, though we must have others, such as towel clips and needle holders, and a few *one-purpose tools for special jobs*.

The aim of every craftsman should be to do the best work he can. Skill comes with repeated performance, and a surgeon can increase the number of times he does any particular thing either by doing everything more often or by limiting the number of things he does. The second alternative is the more practicable. He can limit the number of different instruments he uses and limit the types of movement his hands are called on to perform.

Two movements are in constant use in surgery, the opposition of the thumb to the index and medius, with which spring tools, such as dissecting forceps, are held (Figure 15a), and the abduction and adduction of the thumb opposite the radial side of the curved and fixed index, medius, or annularis, with which hinged instruments are opened and closed (Figure 15b). By limiting his designs to these two movements, the surgeon can hope to make his fingers automatically dextrous, but, if he uses needle holders that close with a whole palm grip and open with a further squeeze, or dissecting forceps that open with pressure and close with a spring, he tends to confuse the association centres of his parietal cortex.

Having selected his design, he should decide on the pattern, weight, length, and curve of each that is most suitable to his requirements, and see that only these are given to him when he operates. To be put off with an odd assortment, to accept different patterns at different hospitals, is to abandon all hope of acquiring

that instinctive control of the working end of his tools that is the hallmark of a skilled craftsman

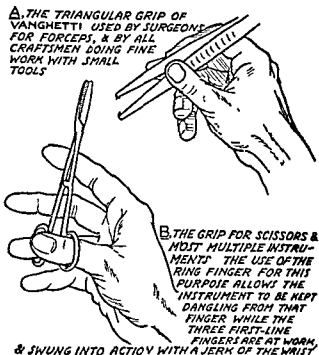


FIG. 15.—Two main grips used in holding surgical instruments

Cutting Instruments Surgical knives are as traditional as the black silk scarf of the sailor, which was introduced to protect his collar from the grease on his pigtail. The shape is that of the sword or dagger, an instrument designed in the Bronze Age to stab, but only occasionally to cut (Figure 16a). A knife cuts with its edge, and a straight knife should therefore be used only to cut a rounded surface (Figure 16b) raised to waist level, such as a ham, a loaf of bread, or a limb to be amputated, or to take a shaving from a flat surface in the horizontal plane, as in skin grafting. In most surgical manoeuvres the knife is held at about 30° to the surface to be cut, so that the effective edge is a short section near the tip, beyond which the point projects to an unknown depth (Figure 16c). Surgical manufacturers have tried to introduce sense without offending tradition by making a knife

with a rounded belly (Figure 16d), but this is no more than a timid move in the right direction. The correct blade was designed

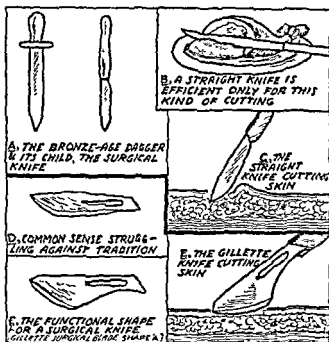


FIG. 16—Knives.

shortly before his death by Cecil Joll, and is made by Gillette Brothers; it fits a Bard-Parker handle and, when held in the usual working position, its cutting-edge is parallel to the skin (Figure 16e).

Holding Instruments. These must pull structures out of the place in which they lie and to which they tend to return. They must therefore take a grip, which will depend for its security either on surface friction or on contour deformation. The better the surface grip, the less need there is for deformation—i.e., for pressure. Instruments intended to hold tissues gently must therefore be able to grip their surface, or even have points to prick it (Fig. 17a), for a small prick does much less harm than a wide or heavy crush. A stitch through the tongue will hold it out with little damage, a spade-shaped tongue forceps will leave it bruised for days. Intestinal clamps have been carefully designed with

knife, they should be so designed that their working end is correctly aligned when the surgeon's hand and arm are in their



FIG 18 —Forceps blades (a) above, forceps with blades closed below, forceps with blades forced apart by included tissue, (b) hold given by blades of normal design, (c) hold given by blades of trap-jaw pattern.

position of function. A haemostat is used either for picking up small vessels, when its points are applied at right angles to a surface, or for gripping wide oozing areas, when its blades are closed parallel to a surface. For both purposes a straight instrument is wrong. A straight instrument is suitable for transmitting a push or a pull in its long axis, one that is used for more skilled purposes is given a functional inclination. An arrow, a spear, and a ramrod are straight, a scythe, a golf club, a hockey-stick, a spoon, and a fork are curved. An aspirating needle must be straight to push and tissue forceps to pull, but a haemostat

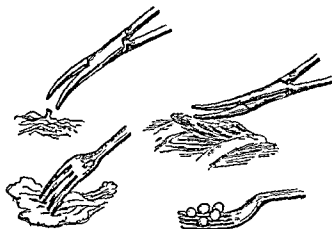


FIG 19 —A haemostat, like a fork, should be inclined so that it can be used at right angles to a surface or parallel to it.

should have a curve or angle of about 30° on its blade, to make it suitable, like a fork, for application in either plane (Figure 19).

Sewing Instruments Sewing is one of the most important tasks in surgery and, for a man, one of the most difficult. It is therefore one in which the surgeon must at the outset select his methods and his instruments, so that he may by repetition ultimately come within reasonable distance of the skill with which his wife darns his socks.

First, he must decide whether he intends to be a hand sewer or a user of needle holders. Every surgeon must be prepared to work with a small curved needle and a needle holder in inaccessible places. Many, particularly those who have the whole time service of an expert theatre team, prefer to use a needle holder for all sewing, since it uses the same movement, a half turn of the wrist all the time.

The man who prefers interrupted sutures likes to work with a needle holder. The surgeon who works with a continuous suture prefers sewing with his fingers, which brings him nearer his work by the length of a needle-holder and gives a more delicate control of the movements of the needle point and a more accurate estimation of the tension of the sutures. Hand sewing is, on the whole, neater and faster.

Having decided his method, the surgeon must select the shape, diameter, and length of the needles he will use. For hand sewing a straight needle should be the best. It is the shape that women use. It is propelled by a thrust along its length, and, while it is being propelled, the direction of its travel and the site of its point are exactly known. But women have their sewing on their laps, and they work on fine flexible fabrics. A straight needle cannot be used in the depths of a wound, and it can be made to take a small bite only if the tissue through which it is being thrust is folded. Curved needles may be of any length, diameter, or curve. The more open the curve, the more do they partake of the advantages and drawbacks of a straight needle—i.e., the more easily are they propelled, the less are they suited to taking up a small bite of tissue and to working in a hole.

The shape of a needle concerns the surgeon. The diameter affects the tissues through which it passes and the suture material that passes through it. A fat needle is the tool of a fat head, it makes big holes and is no stronger than a thin one made of good steel. Needle makers seem to work on a scale of gradations,

their needles of any particular pattern increasing in thickness as they do in length, so that the larger sizes are quite needlessly

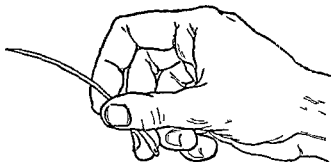


FIG. 20.—Three-finger grip for hand sewing

coarse. The correct diameter of a needle is that which will carry an eye that is an easy fit for the thickest suture material to be used with it. An eye that is only just large enough makes the suture stand out on each side and tear the tissues, one that is too large allows it to drop out.

A needle must be long enough to take a reasonable bite of tissue, while at the same time enough of the eye end remains behind to be held, and enough of the point projects beyond to be grasped. If a reasonable bite of tissue is assumed to be $\frac{1}{4}$ in., a needle for use with a holder requires at least another $\frac{1}{4}$ in. proximally and distally to be grasped with the needle holder, whereas one worked with the fingers requires $1\frac{1}{4}$ in. proximally to allow the three finger grip (Figure 20) which is necessary for accurate control, and 1 in. distally to be seized with the fingers. A needle for use with a needle-holder has therefore a minimal length of $\frac{3}{4}$ in., and one used for hand sewing a length of $2\frac{1}{2}$ in.

I decided many years ago that for hand sewing a $\frac{3}{8}$ circle was best, a compromise between the straight and the curved straight enough for control, curved enough for use in a deep wound. I required three needles, all having the same length and curve—No. 1 triangular pointed to take stout silkworm gut, No. 2 round bodied to take No. 1 catgut for peritoneum, aponeuroses, and soft tissues, and No. 3 to take 00 catgut for intestinal

of even the best theatre sister. The answer lies in a graded set that can be nested together. Nine years ago I designed a set of

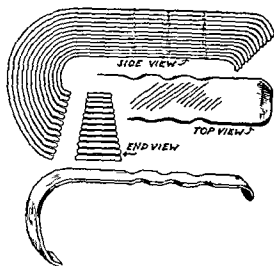


FIG. 24.—Nested retractors of new design

retractors with detachable blades and handles (Figure 23). The set is nested in a tray and can be sterilized and kept on a the instrument table, ready to make up any retractor that demanded. This year I have produced a simpler set of of the curved shape usually known as Deavers (Figure 24). This is easier to make and therefore cheaper than the set, and it provides twelve retractors: the large ones for operations of the rectum, the intermediate for gall bladder surgery, and the smallest for operations in the neck or on limbs.

suture. All standard needles of this length and curve were absurdly stout, and the patterns I required had to be specially

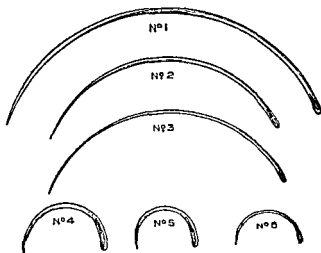


FIG. 21.—Ogilvie needles.

made. For use with a needle-holder I chose three half-circle needles: No. 4 to take No. 1 catgut; No. 5 to take oo catgut; and No. 6 a cutting needle for use with gossamer silkworm gut. The small needles have a flattened shank beyond the eye, so that they do not turn in the needle-holder. These six needles have now been standardized for ten years, and are sold by the Medical Supply Association, Ltd., as Ogilvie needles 1 to 6 (Figure 21).

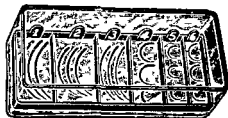


FIG. 22 —Needle grid and box

Having elected to work with needles of two shapes only, I found that the two groups of three, each roughly of the same length and curve, tended to confuse sisters unaccustomed to

working with me. To solve this difficulty I ordered a small plated frame with numbered compartments that can be dropped into any needle-box (Figure 22). Each needle lies in its own compartment, and now, when I ask for No. 3 needle in Southwark or Somaliland, I get the exact curve and diameter I have been using since 1930.

Retractors. A lesser difficulty, but one that must be faced, is the selection of retractors. An operation that is difficult without adequate retraction becomes simple if the right retractors are available. The right retractor is one exactly suited in width and depth to the tissues to be retracted. To provide all the retractors

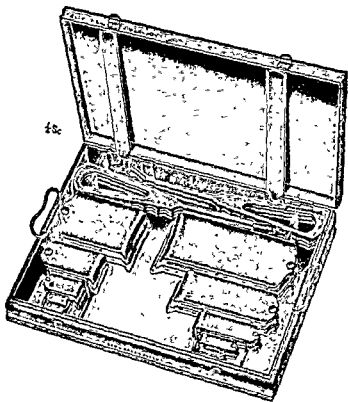


FIG. 23.—Detachable retractors in case.

that may be wanted for every stage of every operation is almost beyond the resources of the average hospital, and to have the right one available just when it is wanted will tax the ingenuity

of even the best theatre sister. The answer lies in a graded set that can be nested together. Nine years ago I designed a set of

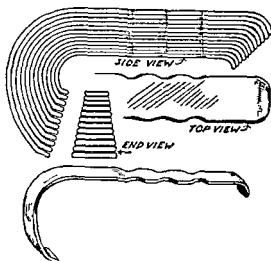


FIG. 24.—Nested retractors of new design.

retractors with detachable blades and handles (Figure 23). This set is nested in a tray and can be sterilized and kept on a corner of the instrument table, ready to make up any retractor that is demanded. This year I have produced a simpler set of retractors of the curved shape usually known as Deavers (Figure 24). This is easier to make and therefore cheaper than the detachable set, and it provides twelve retractors: the largest suitable for resections of the rectum, the intermediate for gall bladder or stomach surgery, and the smallest for operations in the neck or on the limbs.

LAY OUT

The craftsman has the job on his bench. Two or three tools which he is working with at the time are in his hand or beside him, the remainder are in shelves, trays, or racks close at hand, each with its own labelled place to which it is returned after use.

The surgeon's work bench is his operating table, and his material the body of the customer who has brought him the job to do. For tidy work, the table with the patient on it should be divided into three zones: the operation field, the reserve of instru-

ments, and the dump (Figure 25). The first should contain only those instruments in use at the time; the second corresponds

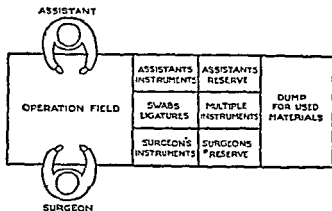


FIG. 25 — Lay-out of operating table.

to the carpenter's tool rack and carries all the instruments and materials that may be wanted; the third is for soiled or discarded implements. The instrument zone is further subdivided into six

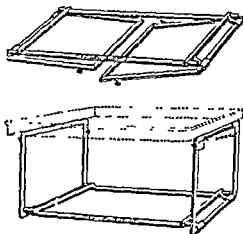


FIG. 26 — Folding stand for tray.

areas: one side belongs to the surgeon, one to the assistant, and the middle is common ground, while each of these territories has a front half for things in constant use, and a back half for reserve instruments.

The technical problems involved are the provision of a stable platform for the instrument zone, and the arrangement on the

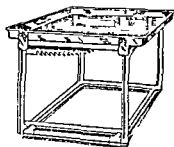


FIG 27.—Instrument tray and stand

platform of all the different things that may be required. They have been solved in my workshop by the stand, the tray, and the instrument rack. The stand (Figure 26) is a simple tubular

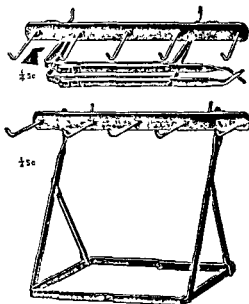


FIG. 28 —Instrument rack.

frame that folds flat for transport and lies under the rubber mattress of the operating table, with the sides hanging down

when not in use. It can be put at any part of the table suited to the operation, and when erected forms a rigid support for the tray (Figure 27).

The tray is an aluminium rectangle with sides 1 in. high, carrying underneath four angle-pieces to fit the sides of the stand. The instrument rack (Figure 28) consists of a horizontal bar carrying five pegs facing forwards, and two short ones facing

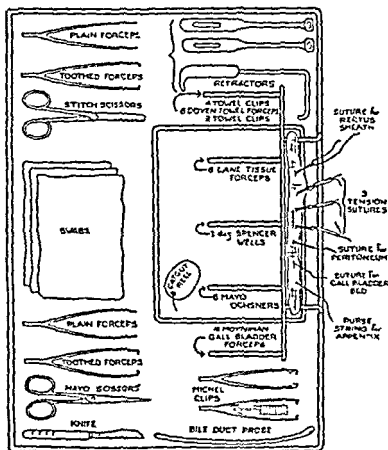


FIG. 29—Lay-out for gall bladder operation.

backwards. This bar is supported on trestles springing from a rectangular frame which serves as a base. The whole folds up for sterilizing, but is rigid when put together. The instrument rack serves as a magazine for multiple instruments, towel-clips, tissue-

forceps, haemostats, and so on, whose proper place is in the back half of the intermediate zone. The back pegs are intended to take a strip of gauze in which threaded needles can be placed ready for the surgeon. The exact arrangement of materials on the tray and of instruments on the rack is a matter for individual preference, and the diagram (Figure 29) of my own arrangement for a gall-bladder operation is merely intended to show the equipment in use.

In practice the system allows the team to have in the operation area only the tools actually being used and one clean swab apiece. When an instrument is finished with, it is laid in its place on the tray if a 'first line' instrument (knife, scissors, dissecting forceps, ligature reel), and given to the nurse if it is a multiple instrument or dirty. The nurse's duties are merely to see that the stock of swabs and ligatures in the intermediate zone is replenished, to wash the instruments given to her and return them to their appropriate place or peg, and to have threaded needles ready

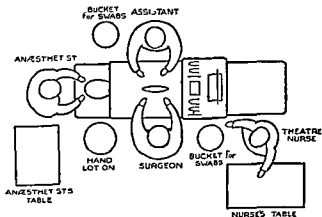


FIG. 30.—Arrangement of theatre

(Figure 30) The surgeon used to the system gets precisely the same service wherever and with whomsoever he works. He comes to know the place of everything by instinct and, without taking his eyes off the wound, can reach out and get the exact instrument he wants.

ENVOI

These are the materials and the tools of our craft We shall undertake more ambitious tasks as new discoveries bring better tools and methods to our workshops, and we shall do them better as craftsmen from all countries pool their designs and their experience But our aims must remain the same to treat each customer as if he were the most important man in the world, and to do the job he entrusts to us as well as we can, to divide tissues cleanly and gently, so far as possible along anatomical planes, to forestall haemorrhage by seizing every vessel as it is encountered and by ligaturing it with the finest material, and to close the wound by anatomical reconstruction and to obliterate all dead space without tension or strangulation of living tissue by tight sutures Our patients should return to bed showing no more than the normal physiological reaction to trauma, a reaction from which they will recover in a few hours Our wounds should heal without incident Our scars should be a pink hair line in ten days and should be invisible in three months Gentleness should be instinctive in one who is fitted for the craft of surgery, for the gentle surgeon is a gentle man, he treats tissues kindly because he feels instinctively for their suffering

17 THE SURGERY OF WAR WOUNDS

A FORECAST (1940) AND A RETROSPECT (1945)

THE PROBLEMS 1940

(*Lancet War Primer*, Chapter I)

IT is remarkable that the problem of wound infection, which has engaged the attention of mankind since the dawn of history, should still be a topic of discussion and controversy. Seventy years ago it seemed to be solved: the causes of putrefaction and hospital gangrene had been discovered, the antiseptic method of wound treatment had triumphed, and infection was fast disappearing. Yet to-day the solution still eludes us, and we are even beginning to doubt whether much of the road trodden so laboriously may not have been in the wrong direction.

Infection did not greatly trouble the early surgeons, though the injuries of warfare were almost the only wounds they encountered. It may have been that the fatalists of those hard and religious days looked upon death as a matter for comment rather than analysis, it may have been that our ancestors retained much of the power of beasts to repair damage and combat the attacks of bacteria, but it is more likely that the proportion of gross infections was actually low. Wound infection or hospital gangrene first attracted attention in the eighteenth and nineteenth centuries, coincident with the founding throughout Europe of hospitals for the segregation and care of the sick and the development of planned operations, whose failure due to sepsis would naturally excite more comment than death on the field of battle.

The misery, the stench, the horror of a hospital ward in those days can be guessed from the writings of older surgeons, who indeed realized to the full the dangers that faced their patients, and did all that their knowledge would allow to alleviate the suffering they were powerless to prevent. Some came very near the truth. Randall, in the seventeenth century, postulated the existence of some minute and invisible animal or plant which caused the suppuration, but had not the means to prove his

theories Hunter brought his wonderful powers of observation and reasoning to the problem, and came as near its solution as his methods of investigation would allow. It was not till the invention of the compound microscope that the way lay open for Pasteur to identify the germs of putrefaction, and for Lister to suggest a way to combat them in the wards and operating theatre.

To Lister and his followers the world was full of germs that must be attacked—in the air round the operation, on the instruments, hands, and clothing of the surgeon, in the operation field, and in the wound discharges afterwards. All germs were much alike, and except for a few striking examples like the bacilli of tetanus and anthrax the specific organisms responsible for infections of different types were not identified. Attention was concentrated upon killing the bacteria, and little was known of the defences of the tissues. Nevertheless, by such a simple faith, and by such crude methods as the carbolic spray, a revolution was effected that has probably never been paralleled in the realm of human endeavour. Wound fever and gangrene disappeared from the hospitals, childbirth was no longer an ordeal to be dreaded, compound fractures, which had formerly ended in death or amputation, united nearly as readily as simple ones.

With the fear of infection abolished, the way lay open to the exploration of all parts of the body and the addition of a third method, reconstruction, to the two standard procedures of surgery, drainage and excision. Surgeons were quick to embrace the opportunities thus presented to them. Before Lister, operations had been limited to the drainage of abscesses, amputations, the removal of stones from the bladder, and the excision of surface tumours. Within fifty years of his first tentative demonstrations every cavity had been explored, nearly every operation that is known to day had been performed or projected, and countless diseases formerly hopeless had been brought within the range of curative surgery.

The discovery of the bacterial origin of suppuration, and the period of intensive study and inquiry that followed, distracted attention for many years from the natural mechanism of defence possessed by the body, and threw into the shade the progress that

had already been made in the conquest of infection by surgeons who were scrupulously clean in their operating and who favoured the natural reaction of the tissues by delicate handling at the time and rest afterwards. By such means alone Spencer Wells in London, Lawson Tait in Birmingham, and Spencer and Keith in Edinburgh were setting a new standard of safe and successful surgery, and showing results that would bear comparison with Lister's first tentative experiments in antiseptics. Gamgee, a leading exponent of the school of gentle surgery for which Birmingham had been known since the time of Robert Mynor a hundred years before, wrote in 1887 'The question is not one of antiseptics or no antiseptics, but of the form and proportions in which they should be employed in particular conditions. The great antiseptic is life. The living tissues have a natural preservative power which, if guarded and conserved by the surgeon on physiological principles, offers the surest guarantee for healthy repair which is only an adaptation and extension of normal nutrition.' These words might have been written to-day.

It would be unjust to say that natural immunity and resistance to infection were forgotten during the Listerian renaissance, for in this period the cellular changes of the inflammatory reaction were recognized, phagocytosis was described by Metchnikoff, and the biological mechanisms of immunity were studied by Ehrlich, Almroth Wright and others. But surgeons still pictured themselves as knights whose mission was to rescue a nearly helpless patient from the hordes of bacteria that prowled on every side. Sepsis was a simple matter of the entry of germs into a wound, asepsis was the avoidance of germs, antiseptics the killing of germs that had arrived, disinfection the eviction of those already established. It was insufficiently realized that the chemicals employed in surgery were not so much antiseptic as antivital, that they damaged the defence mechanism as well as the invader. Pus came to be looked on as the symbol of evil, and house surgeons were taught to change dressings as soon as they were soiled, to syringe sinuses till they were absolutely clean, to take out drainage tubes several times a day for sterilization. The South African war did not shake the faith of the antiseptic school, for the casualties of typhoid greatly exceeded those caused by the enemy, and the wounds inflicted by the long mauser

bullet in a country whose soil was almost free from pathogenic bacteria rarely became infected

The war of 1914 to 1918 brought the problem of wound infection in its most acute form before a generation of surgeons who had never seen hospital gangrene, but had grown up in the complacent belief that sepsis had been mastered, that its grossest manifestations, at any rate, belonged to the bad and buried past. All wounds suppurated and dressings and antiseptics seemed to be powerless. Septicæmia, pyæmia, and gas gangrene made their appearance. The wards of military hospitals were filled with fever-stricken men. The compound fractures of war were as fatal as those of a century before, so that amputation became once again the commonest of operations.

At first the cry was 'back to Lister,' and those who directed surgical opinion sought by the use of stronger and stronger antiseptics applied at an earlier and earlier stage to stem the scourge. It was only by the failure of such attempts, and by bitter experience, that they learned that *in infection the soil is no less important than the seed*, and that healthy tissues have powers of dealing with bacteria which, if aided rather than hindered by the surgeon, can usually be relied upon to turn the scale against the invader. Thus it became the aim of the military surgeon to convert a war wound into a healthy one by removing not only *foreign matter and dirt containing bacteria*, but *dead and damaged tissues* in which bacteria might multiply, and by obliterating dead spaces in which discharge might collect to form a culture medium. It was further realized that the state of surrounding structures and of the patient himself was nearly as important as that of the wound: that unless the injured parts were rested the tissues could not heal, and that without measures directed to combat shock, cold, and fatigue, fluid loss and hæmorrhage, the whole mechanism of repair was frustrated. In the last years of the war, surgeons at the casualty clearing stations were able by excision and immediate suture, or in some cases by delayed primary suture, to avoid altogether the most severe infections in casualties brought to them within a few hours of wounding, and to secure clean healing in the great majority.

There remained the problem of the wounds already grossly infected when first seen, and of those in which infection super-

vened later. Where early excision had removed the breeding ground of devitalized tissues on which bacteria could multiply, gas gangrene and the more calamitous manifestations of sepsis were seldom seen, but once infection had appeared rapid disinfection proved impossible, and it was clear that any attempt to remove bacteria already established, mechanically by excision or chemically by strong antiseptics, did more harm than good. Three methods proved their worth in such cases. In the French army the combination of free drainage, abundant absorbent coverings, complete immobilization in plaster of Paris, and infrequent dressings, which had been advocated in the Franco-Prussian war by Ollier, once again proved phenomenally successful. At Compiègne, Carrel worked out the plan of intermittent irrigation with hypochlorite solutions. In the British army, while many followed Carrel, excellent results were obtained by the use of 'lymphagogues' in the form of hypertonic solutions of common salt or magnesium sulphate. Common to all methods was the insistence on free drainage and rigid immobilization.

During the last twenty years surgery has been in the hands of men trained in the war, and the lessons of the casualty clearing station have dominated technique. Gentle surgery, though it is often attributed to the example of men like Lane, Halsted and Moynihan, is, above all, an acknowledgment of the basic truth that clean repair is the work of healthy tissues, a truth rediscovered in the tragic school of war. Relying on rigid care to exclude bacteria, and on the bactericidal power of the tissues to kill the few stray intruders, the modern surgeon has little use for antiseptics in planned operations and little need for them afterwards. Anatomical approach, clean cutting, careful haemostasis, gentle retraction, reconstitution at the end of the operation of each divided plane with the obliteration of every dead space, and the use throughout of ligature and suture material of the finest calibre compatible with strength, ensure consistent healing by symptomless first intention—a different matter from union with some reddening of the skin edges and a little discharge between the sutures that passed for first intention in the early Listerian period, and that was first intention in comparison to the gross suppuration that preceded it.

In considering the present attitude toward contaminated or

Spanish war to be the best method of treating the wounded, especially the civilian casualties from air raids

Now, after twenty years of quiet advance and leisurely study of wound treatment and wound healing in planned and curative surgery, the problem of lacerated and contaminated wounds is with us again, and with us in an even more serious form, for the injuries of the victims in an air raid seem to be on the average worse than those of the wounded from a battlefield in the last war. We are back to the old controversy on the relative merits of healing by first and second intention and to the realization that pus may be laudable.

We know how to deal with the clean wounds we make. We learned much of the treatment of lacerated and contaminated wounds in the last war, and at the end obtained results incomparably better than at the beginning. How far will that knowledge help us to-day, and how far will it be modified by the advances that have been made in the laboratory, by the experience of the Spanish war, by what is even now being learned in our units? Where should the primary surgical treatment of the wounded be carried out? What treatment should they receive before this, and by whom? Should we excise all wounds, or only those grossly lacerated and contaminated? After excision, should we suture them, or drain them and leave them open, are we right to attempt primary union, or should we choose second intention healing with its increased safety? If we suture, how can we guard against secondary infection later? What type of dressing should we use, and when, where and by whom should it be changed. When we dress excised wounds should we wear gloves and masks, and use the same precautions as at operation? How should we use antiseptics, and which are best, should we combine them with the first dressing, apply them to the wound in combination with excision, reserve them for cases already infected, or avoid them as far as possible. What is the place of active and passive immunization in the prevention of infection and of specific antiserum and vaccines in its treatment? What will be our attitude to chemotherapy? Should we give it in prophylaxis or limit its use to cases with evidence of infection? Can we administer these drugs safely to men who are already suffering from shock and loss of blood, and how long can we continue them without risk? Will they

personnel in relation to the numbers reaching them—all these things modify the methods of the war surgeon and govern his results

It is tempting to ascribe improved results to technical advances, to give the credit to the surgeons and their methods rather than to the circumstances in which they have worked. The state of the casualties coming back from Europe has been magnificent. While giving every credit to the organization and personnel of the B.L.A., we must remember that the campaign in which they were engaged was the final blow in the struggle, that our armies were overwhelmingly superior in all weapons, that the medical formations were better served than ever before, that never in the history of war have such short lines (in time rather than distance), such abundant medical personnel in relation to casualties, and such smooth transport been known before. Similarly in comparing statistics from different fronts at the same time, and from the same front at different times, we must make due allowances for circumstances. The recovery rate in abdominal wounds in the B.L.A. has exceeded that in the C.M.F., but every war surgeon knows that the result in these grave injuries depends largely on circumstances outside his control. Lowdon,¹ who has been with a forward unit in the Desert, in Italy, and in Northern Europe, found that the nearer he worked to the line, the greater the proportion of serious injuries he received and the higher his mortality. He also found that his death rate for abdominal wounds was appreciably higher when his patients were physically exhausted, as they were in the first fortnight of the Sicilian campaign, than it was earlier in the Desert and later in Italy. B.L.A. figures are those which a group of surgeons should get under satisfactory conditions, C.M.F. figures are those that the same surgeons might be expected to produce under more difficult conditions, and they are in each case matched by results in earlier campaigns in this war when conditions were equally favourable or adverse. The remarkable results with delayed wound suture reported by Edwards, Stammers and their colleagues in the C.M.F., again demonstrate what good surgeons can attain when conditions are satisfactory, rather than any new surgical procedure or any spectacular

¹ A. G. R. LOWDON *Edinburgh Medical Journal* 1945 51 257

advance in method peculiar to Italy. The C.M.F. figures, despite transfusion, penicillin, and the many auxiliaries to *disinfection* and tissue repair that help the modern surgeon, are substantially the same as those of small groups of surgeons in the B.E.F. in 1917. But in Italy the conditions of warfare made it possible for a *fine organization* to extend the benefits of delayed suture to a far higher proportion of wounded men.

The principles of the surgical treatment of soft tissue wounds are simple: they are excision at the earliest possible moment, and suture at the earliest safe opportunity. The first principle, excision, needs no long discussion. Whatever word—French, Latin, or Basic English—he may use for the operation, every surgeon uses a similar layer by layer technique in excising dead, damaged, and soiled tissues from a wound track. But the ability to excise is very much limited by the surgical potential of any force in relation to its casualties. Ten surgeons can excise 150 wounds a day, but they cannot excise 1000, and if they are overwhelmed by numbers they may have to resort to much simpler procedures, relying on free drainage, immobilization, and the administration of sulphonamides (for any penicillin routine depending on frequent parenteral administration would inevitably break down under the same hard conditions) for the safety of their wounded. The second principle, early suture, needs some elaboration. A wound may be closed by primary, delayed primary, or secondary suture. These terms cannot be defined with any exactness, for each may merge into the other, but they mean closure at three different stages in the process of repair. Primary suture means suture at the end of the operation of excision, while the wound surfaces are still fresh. Delayed primary suture means suture after an interval, but an interval so short that the cut tissues have much the appearance of a fresh wound, and can be sutured without further *trimming*. Delayed primary suture is usually performed within the first week. Secondary suture means suture after the wound surfaces have been sealed off by the processes of repair—that is, when the tissues are covered by a layer of healthy granulations. This process is rarely complete till the third week. Secondary suture therefore implies re-excision of the wound surfaces and reconstitution of its original planes, and suture of the fresh surfaces so formed. A pronounced

difference between surgical policy in this war and the last is that primary suture is now frowned on as an unwarranted gamble at the patient's expense. It is unwarranted, because the results of delayed primary suture are as good, or nearly so. It is a gamble because the trapping of discharges and the setting up of tension which may follow suture can lead to cellulitis, gangrene, or even death if virulent organisms are present in the wound. Which method of suture is employed depends on circumstances rather than policy. Delayed primary suture, which saves suffering, time, materials, and hospital beds, will obviously be chosen where circumstances are good. But where the number of casualties is considerable in relation to the surgeons who have to operate on them and the nurses who have to look after them, where the base hospitals are distant and the journey rough, secondary suture must be preferred. When conditions are still worse, when the number of casualties is really great, and particularly where they are all retained near the place of wounding, as they must be in any beleaguered town or island, or in a force whose advance outstrips its transport, as in Cunningham's dash through Abyssinia, the closed plaster technique comes once more into its own.

18 SURGERY GOES TO WAR¹

(*Edinburgh Medical Journal*, 1945, 52, 193-205)

IN ancient times, and even a hundred years ago, the title 'Surgery goes to War' would have sounded as trite as the phrase 'The R.A.F. takes to the Air' would sound to-day. That it does not do so now is due to the revolution that took place in this city and in Glasgow some eighty years ago. Before Lister, what we now call traumatic surgery formed the chief employment of surgeons. The armourer to repair the wounds of the soldier's casing, and the surgeon to repair the wounds of his body, were the chief technicians who accompanied an army in the field. The great surgeons of the past learned their art and established their reputations at the wars. Wiseman, Paré, Larrey, made the battlefield their laboratory and the tent their study, and wrote of wounds, infection, and haemorrhage. John Hunter, that great Scotsman who may be called the father of research and who did more in a lifetime to advance surgery than any man before or since his day, accompanied the expedition to Belle Isle at the most impressionable period of his career.

With the discovery by Pasteur of the cause of infection and the demonstration by Lister that infection could be prevented, and by MacEwen that it could be avoided, the centre of interest shifted from traumatic surgery to deliberate surgery. The wounds studied by the surgeon were those of his own making. The problems of healing and infection passed into the background and were succeeded by a search for the anatomical limits of exploration, the pathological territories open to operative reclamation. New surgeons and new surgical schools sprang up everywhere.

The staggering advances of the post Listerian epoch have been obtained by the contributions of individuals and schools in many countries, often working at problems identical with those being investigated by neighbouring groups, and by the gradual emergence, among competing views, of those that appeared to be

¹ A Guest Lecture in Surgery delivered at the University of Edinburgh on November 16 1944.

best. Attempts to collate experience on a large scale have been foiled by a lack of uniformity in outlook, in methods, in standards, and in material. Civil surgery suffers from Horner's syndrome, not that described by the eminent German, but that given by the unknown author of the nursery rhyme¹. The peace-time surgeon sits in his corner with the fruits of his labours, removing trophies through small incisions, with expressions of evident satisfaction at his own prowess.

War provides the supreme corrective to this attitude. It is an experiment on a grand scale which, rightly used, can give an unequivocal answer to many of the questions that have been debated between rival schools. The subjects of experiment are all of the same sex and in the prime of life, and they are all initially healthy, so that any lesion can be observed uncomplicated by the disturbing factors of debility, concomitant illness, age extremes, and the nutritional and endocrine failings which confuse the picture in civil practice. The experiments are numerous enough to eliminate the errors inherent in a small series. The observers are as impartial as any observer can be, since no motive of private or corporate advancement enters to warp their judgment, and a series of different observers study each case in turn. The whole experiment is helped by an administration whose aim is to promote efficiency and to help any investigation that will lead to greater efficiency in the future. There is a record system, utilitarian in origin, but of the greatest value scientifically. And the whole experiment is conducted in the spirit of a country in arms, that mass call to united effort and the suppression of personal ambition that relieves war of much of its sordidness.

It is often said that war surgery is merely a return to the crude experiences of its early history. This view is taken too often by the governing bodies of teaching centres. In assessing the capacities and planning the future of their younger graduates, they are apt to assume that their more brilliant students, who left *junior appointments at the beginning of the war to serve with the colours*, have been wasting their time wallowing in blood and

¹ Little Jack Horner sat in a corner
Eating his Christmas pie,
He put in his thumb and pulled out a plum
And said 'What a good boy am I.'

chopping off limbs, with no stimulus to think, no opportunity to read, and no inclination to develop that critical and inquiring outlook which is the hallmark of the scientific spirit. They turn instinctively to those who have remained behind in the atmosphere of the laboratory, the lecture theatre, and the operating room.

War may bring a reversion to the primitive problems of surgery, but is the work, therefore, less scientific or less valuable? It were truer to say that war brings a return to the foundations of surgery, and just as no nation can be great which has no pride in its history, so no art or science can remain healthy or progressive which does not from time to time review the foundations of its structure. The basis of surgery is the treatment of wounds and injuries, for even the most delicate operation of the super specialist, perfected by yearly improvements and daily repetition into a work of fine art, is nevertheless an injury, a wound which must heal. In treating the wounded, the war surgeon is learning the art of his profession, the capacity to assess surely, decide quickly and act confidently, the readiness to subject his own interests to those of the patient, the ability to work as a member of a team *for the common good*. In observing the reaction of the body to injury he is returning to the groundwork of all surgical science. And in studying these processes with careful precision, recording what he observes and not what he is told should or does happen, in applying to each method that he uses the same critical standards, he is conducting research in the highest sense. For research means inquiry, and inquiry into the limits of the known demands no less industry, no less discrimination, no less originality than inquiry into the unknown. When we pause to switch the torch of investigation, which has been turned solely into the darkness ahead, to light the path behind and the land on each side of us, we learn not only of the way we have come and the place where we stand, we learn more of where we are going and what is the best way to get there.

The fundamental lesson of this war is a reaffirmation of the vitalistic faith, the rediscovery and amplification of what was learned in the last war, which in turn was a revival of the outlook of surgeons in previous wars, indeed of all thinking surgeons since time began. It is a belief that the chief duty of the surgeon

is to study Nature, to find out the processes by which she fights infection and effects repair, to help them, to imitate them when they are lacking, above all, not to hinder them by meddling interference. This was the outlook of Hilton, of Hunter, of Pare, of the Salernian school, of Hippocrates. But it was lost, or rather overlain, in the tremendously eventful years that followed Pasteur's discovery and Lister's practice.

Before the invention of the compound microscope, which was a prerequisite to the discovery of bacteria, surgeons were necessarily limited to the study of the processes of resistance of the body. They realized that to the healthy all things are healthy, that a wound in a robust countryman will heal, while a similar one in an old man or a sick man will suppurate. But Lister's disciples, following the bacterial theory with the fanatic enthusiasm and pure faith of the Communist who knows only one good and one enemy, lost sight of this direct outlook. They forsook the bedside for the laboratory and the operating theatre. They were crusaders, vowed to rescue mankind from the bacterial hordes that threatened to engulf him. They did not sufficiently realize that the weapons with which they set out to do battle against the germs were protoplasmic poisons, harmful in some degree to all living matter, and damaging the defence mechanism as well as the invader.

The first world war came as a sudden shock to upset the complacency of the theorists. Antiseptics that gave a high coefficient in the laboratories, and that seemed to work wonders in the wards, were powerless in face of the contaminated wounds and massive infections that were seen for the first time by the surgeons who had to treat them. By bitter experience it was learned that in infection the soil is no less important than the seed, that pathogenic organisms can usually be killed by the healthy tissues of a healthy patient, on the other hand that organisms which are barely pathogenic in normal circumstances can cause *fulminating gangrene when planted in large numbers in devitalized tissues, or in a patient whose resistance has been sapped by haemorrhage, exhaustion, exposure, thirst, or concomitant illness*.

The school of surgery that was founded on the battlefields, the outlook that seeks to favour the powers of natural resistance

which it has been carried. Precautions to prevent such infection during operations and ward dressings have been adopted in all military hospitals.

The second was the discovery, in the sulphonamide group of drugs, of a new principle in antiseptics. Former antiseptics were all harmful in some way to living cells, and though drugs with an almost specific action on certain bacteria, and groups with a powerful antiseptic and little toxic action, such as the acridines, had been discovered, the ideal substance, lethal to bacteria and harmless to the host, had not been invented. The sulphonamides seemed, for the first time, to offer such action.

The third was the perfection of the methods of blood transfusion, and the transformation of a method, which started in the first war as a life-saving expedient, into a routine procedure in major surgery.

The fourth was a wide acceptance of the closed plaster method initiated by the French in the first World War, popularized by Winnett Orr in the intervening years, and applied on the universal scale to the war wounds of the Spanish civil war by Trueta, as the most successful way of treating lacerated and contaminated wounds.

and to work with and through them by gentle handling, removal of all dead tissues, accurate haemostasis, and the obliteration of all dead spaces, has dominated surgery between the two world wars, indeed, the creed of Ambroise Paré, 'I dressed him but God cured him,' has become that of modern medicine in the wide sense that we believe that the maintenance of health, the resistance to disease and infection, and the repair of injury are the normal concern of mechanisms that have been developed through ages of evolution and are present in every healthy individual, and that the first duty of the physician is to maintain that health at all times, and to work with and through those mechanisms when it is impaired. The recognition that in many diseases such as poliomyelitis and epidemic jaundice the whole population is probably exposed to infection, but only a few individuals who show a diminished resistance succumb, exemplifies the new conception of infection that is arising. The care that is now devoted to the pre operative 'tuning up' of patients, the detailed analysis of their circulatory and metabolic reactions that is made during the operation, and the fervour with which their needs are assessed and met afterwards, show that the reaction to trauma is regarded in the same vitalistic way. Rehabilitation is more than a catchword, it is one expression of the new ideal in medicine which aims, not merely to restore the sick to where they were before illness overtook them, but to raise every citizen to the highest state of health of which he is capable.

This war, then, found surgery fully prepared for the treatment of wounds, conversant with the failures and lessons of the last war and determined to avoid the first and apply the second. Four developments in the inter war period had modified, without altering, the fundamentally Hunterian trend of that outlook.

The first was the recognition of the frequency and danger of cross infection in wounds, particularly by streptococci. The bacterial flora of a wound was formerly thought to be that introduced at the time of infliction. Towards the close of the last war it was shown that the incidence of streptococcal infections increased rapidly during the progress of patients from front line to base. With the separation of streptococci into types, it has been possible to prove cross infection, and to trace the patient or attendant from whom the infection has arisen and the route by

which it has been carried. Precautions to prevent such infection during operations and ward dressings have been adopted in all military hospitals.

The second was the discovery, in the sulphonamide group of drugs, of a new principle in antiseptics. Former antiseptics were all harmful in some way to living cells, and though drugs with an almost specific action on certain bacteria, and groups with a powerful antiseptic and little toxic action, such as the acridines, had been discovered, the ideal substance, lethal to bacteria and harmless to the host, had not been invented. The sulphonamides seemed, for the first time, to offer such action.

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Thus, then, is the aim, and these are the weapons with which surgery went to war. What has been achieved? In general it can be said that the wounded soldier of to-day has twice the chance of surviving that he had in the last war, and a still greater chance of surviving with useful function. Some figures, taken over a long enough period and from enough cases to eliminate the element of chance, may be quoted.

Penetrating head injuries	Mortality 17 per cent ¹
Penetrating chest wounds	" 13 "
Penetrating abdominal wounds	" 30 "
Thoraco-abdominal wounds	" 30 "
Compound fractures of the femur	" 7 "

In comparing these results with those of the last war, it must be remembered that they represent a more severe type of case. The doubled recovery rate of to-day is in patients of whom at least

¹ These figures were improved upon considerably during the final campaign in Europe.

20 per cent are so seriously wounded that they would then have been numbered among the killed

This improvement is due in the main to better surgery, but not at all to better surgeons. I yield to none in my admiration of the forward surgeons in this war. They have shown skill, initiative, devotion, courage, and mere physical doggedness to a degree that those who have not seen them at work can hardly believe. But to suggest that they rival in any way that brilliant band who worked in the C C Ss behind the Flanders front in 1917 and 1918, and set a standard to equal which is the highest aim of any war surgeon, would be absurd. Their work is excellent. Their results excel those of their predecessors because they are working on better materials and with better tools.

That the soldier of to-day is better human material than his father cannot be proved, but will be denied by few. He has enjoyed a quarter of a century of better social, economic, and nutritional conditions, and in the army he has been trained to the highest pitch of fitness of which his frame is capable. He has been called to face many hardships, but seldom has he been exposed for weeks to mud and wet, short of water and sleep, and subjected to bombardment day and night as his father was. His natural resistance to injury and sepsis appears to be correspondingly greater. Wounds in men who have lain out for days without any attention are often found to be remarkably free from serious infection. Gas gangrene, in the same terrain and with weapons that are, on the whole, more destructive, is very much less often encountered than in the last war.

Smoother transport, earlier and more thorough resuscitation, and the use of chemotherapy, all combine to make the surgeon's task in the forward centres an easier and more hopeful one. At the operation itself the importance of modern anaesthesia can hardly be over emphasized. Men so severely wounded that they will die from infection if their wounds are not excised, are in danger of succumbing to shock after operation and to chest complications later if they are anaesthetized by any of the older methods of inhalation anaesthesia, for such a well chosen anaesthetic skilfully administered is the deciding factor in survival. The less seriously wounded are sent from the theatre to an evacuation

ward or tent where skilled supervision of the recovery phases is impossible, for them the value of pentothal, which abolishes post operative vomiting and allows full recovery by the time the journey is due, can be appreciated

That new methods rather than greater skill are the most important factors in giving the improved results of the surgery of this war can be realized if we consider penetrating wounds in the abdomen. At the beginning of the last war these wounds were considered to have a better chance if they were not operated on. After Cuthbert Wallace had reversed this policy, the mortality of abdominal operations was, nevertheless, so appalling that it was considered advisable to establish advanced abdominal centres to which such injuries were segregated. These were staffed by men who to day hold leading positions in surgery throughout the country. The figures of the last war are therefore the figures of surgeons well above the average. Further, they are selected figures, for all that were published were those of individual surgeons, or of specialist groups, and it was never possible to analyse a large unselected series which contained the good and the bad, the lucky and the unlucky, the picked cases with the desperate chances, as has been done repeatedly in this war. Then, too, 'evacuation to the base' was accepted as a criterion of recovery, it is now known that a mortality so assessed is about 10 per cent too low. It can be said, quite fairly, that the death rate of abdominal wounds in the last war was at least 60 per cent. In this war it was under 40 per cent in the Western Desert, where conditions for operating and for after care were infinitely worse than they were on any front in 1918. When conditions improved, when the wounded could be brought smoothly and within a reasonable time to a well-equipped operating centre with beds and nurses, the death rate has been 30 per cent or less. In the campaign in Europe it has remained around this figure month after month in spite of the fluctuating nature of the fighting and the appalling conditions under which some of the surgeons were working.

Only one advance in operative technique can be cited as having contributed to this halved mortality, the practice of exteriorization of all colon wounds. These wounds still show a mortality

above the average, but one about two-thirds of that in the last war

	<i>This War</i>	<i>Last War</i>
Colon alone	40 per cent	65 per cent
Small intestine and colon	55 per cent	75 per cent

The methods which have made the difference are accessory, rather than operative. Death after abdominal wounds, as after all others, is due to haemorrhage, shock or infection, which in the abdomen means peritonitis. To combat the first two we have the resuscitation service which has already been alluded to, to combat peritonitis, which is fatal less from the infection itself than from the ileus to which it gives rise, we have the methods of continuous intravenous administration of fluids, and continuous gastric suction. It is still not realized by many how new these methods are. Transfusion was known and practised between the two wars, the rapid and complete replenishment of the circulatory volume both quantitatively and qualitatively which resuscitation implies to-day is largely due to the teaching and example of Lieut. Colonel C. H. Buttle, and was first practised in the Western Desert in 1942. Continuous intravenous medication was first advocated by Matas and Hendon in 1926, and continuous gastric suction was used by several surgeons working independently a few years before that date, but the practice of using both in all penetrating injuries of the abdomen in order to anticipate rather than to treat ileus was again first introduced in the Middle East in 1942, following the example of Major Giblin of the Australian Medical Corps.

But it is in the surgery of flesh wounds, the largest and at the same time the most important part of the military surgeon's work, that the lessons of this war can be appreciated and the progress that has been made can be assessed.

At the beginning of the war the value of prophylactic wound excision within the grace period, before contamination passed on to infection, was fully accepted, but it was also considered that after this period, when any of the clinical signs of infection were present, surgery must be limited to the barest life-saving measures, —the arrest of haemorrhage, the removal of foreign bodies and obviously dead tissues, the provision of free drainage, and the immobilization of injured parts. These views prevailed during

the phase of the phoney war and the brief campaign in France. The one lesson that was learnt during this phase was that the primary suture of war wounds, even those received within a few hours and excised with the anatomical completeness of a cancer dissection, was fraught with the gravest danger unless the surgeon was able to keep the patient under his personal and constant supervision till healing was complete. This lesson, which cannot be cited as an advance but rather as the correction of a heresy, is still insufficiently mastered. Even within the last months wounds have gone septic, limbs have been amputated, and lives have been lost owing to the suture of wounds by surgeons too ignorant to know and too complacent to learn.

After the fall of Dunkirk, Europe ceased to be a combat zone, and for three years the school of war surgery, and the trial ground for new methods was transferred to Africa. Here, as in all warfare, the problems and their solutions were modified by local conditions, by the huge distances, the rapidity of movement and the fluidity of line inherent in modern mechanized warfare, the difficulty of supplies, and the relative sterility of the soil. Surgery was done by small units whose extreme mobility limited their supplies to bare necessities, and whose patients must usually be sent after operation on a long and rigorous journey through unknown hands to an unknown destination.

Surgical practice began where it had stood at the time of Dunkirk. The standard treatment was the excision of early and the drainage of late wounds, the covering of excised surfaces and the maintenance of drainage by vaseline gauze, and enclosure of the limb in an unpadded plaster case. Two accessory measures, the sulphonamides and resuscitation, were being explored for the first time on a large scale.

When the war in Europe shut down, the power of the sulphonamides to prevent infection had been proved in the laboratory but no firm conclusion of their value in war surgery had yet been reached. In the Middle East it soon became apparent that men who had been given sulphonamides, even in irregular quantities, arrived at the base in better condition than the rest. By the institution of a sulphonamide label and twice-daily dosage, it became possible to assure that every man ordered the drugs received them from the time of leaving the field ambulance to his

arrival at the base. With this regime, the great majority of wounds, even those that had received no surgical treatment, arrived at the base clinically clean. This was particularly observed in head injuries which, from Alamein till the fall of Tripoli, were flown back to Cairo for operation. All were given sulphonamides from the time of wounding and during the journey, and in the great majority it was possible to operate and close the scalp wound, even up to six days, with primary union in about 90 per cent.

The use of blood and plasma in forward surgery was well established in the campaigns in France and Norway. However ill we were prepared for this war, however slow we may have been in producing effective weapons, we may pride ourselves that the British Army Transfusion Service, under Brigadier Whitby, had, at the outbreak of war, devised an organization for the collection and manufacture of body fluids, for their distribution to the fighting forces, and for their administration in the field, so perfect that it has been enlarged, and reproduced in many countries, but modified in detail only. We may also claim that in our field transfusion service we have a means of resuscitation and of treating *haemorrhage and shock far better than any other army possesses or has possessed*. But in 1940 this new weapon for the fight behind the lines was still being handled gingerly and used with caution. It was still felt that the safe rate for intravenous replenishment was about one pint in four hours, and that a rate more than double of this might embarrass the circulatory system. It was also felt that in most cases of shock and haemorrhage plasma was safer than blood, more certainly sterile, more free from reaction, more easily administered and flowing more freely.

In the Middle East blood was used more and more, first tentatively, then with conviction, finally with the enthusiasm of the convert who has seen the light. It was found that no blood loss, however catastrophic, need be fatal if the injury from which blood is being lost can be repaired and if the lost blood can be replaced sufficiently early and rapidly with blood. It was learned that after lesser haemorrhages a man can only be brought to the best state his injuries will allow if his circulatory loss is made up, not merely in volume but in cell-content, that with plasma alone his blood pressure may be restored, but he cannot be made safe

for surgery or fit to fight infection. It was learned that the only satisfactory antiseptic against anaerobes is oxygen, and the only satisfactory applicator of oxygen is the erythrocyte, that men whose wounds have been excised early and conscientiously and whose haemoglobin has been brought up to 100 per cent do not get gas gangrene. Finally, a standard was arrived at, that in a surgical group ten miles from the line, 25 per cent of the casualties would need resuscitation and each would need an average of 3 pints, twenty miles back 10 per cent would need resuscitation, the same amount, 3 pints, being required for each. In each group the proportion was 2 pints of blood to 1 of plasma, and in a battle it was found that roughly 20 pints of blood to 10 of plasma were required for 100 casualties.

These conclusions from the Middle East have been criticized on the grounds that reactions and even deaths are said to have followed the use of whole blood, but in the hands of an experienced transfusion officer, whose ocular assessment of the quality of a bottle is almost infallible, they should not occur. It will be tragic if the blood which the soldier needs and his comrades at the base and in the factories are only too glad to give, is denied him on the grounds of theory.

The lessons of three years' fighting in Africa may be summarized as follows:

First, that good surgery must be done as far forward as possible. If it is too good, in the sense of too elaborately equipped it will not be far enough forward, and if it is too far forward it will not be good enough. The flying surgical free lance is of very little value except as a gesture, for the preparation and after-care of patients overshadows the operation in importance. The minimum effective surgical group is two surgical units and one field transfusion unit.

Secondly, that the extent of prophylactic excision must be related, not alone to the interval before the operation, but to the subsequent fate of the patient. Where, as in the desert campaigns, a long interval and a difficult journey lay between the forward operating centre and the base, the way to safety, however apparently complete the excision may appear to have been, lay in wide drainage, careful immobilization, and the regular administration of sulphonamides during the evacuation. When

this was done, it was found that the cases treated by careful removal of obviously dead tissues and wide decompression along anatomical planes arrived in as good condition as those subjected to a more classical excision, and could be closed as soon by secondary suture

Thirdly, that the closed plaster method of wound treatment which had proved its worth under static conditions, is unsuitable to a war of movement. The value of the closed plaster is that it confers complete immobility to the injured part and freedom from interference to the wound. To do this it must be unpadded, and must be allowed to remain undisturbed till there are clinical indications for its removal. But an unpadded cast is highly dangerous when wounded men have to be evacuated shortly after its application over long lines where the transport is rough and supervision inadequate.

Fourthly, the treatment of burns, a major problem in a campaign where petrol was plentiful and water scarce, was brought more into line with that of wounds. The burn came to be looked on as a thermal wound, requiring as other wounds do, resuscitation first, surgery and chemotherapy second, and early closure third, rather than a cutaneous lesion to be treated by the paints and unguents of the dermatologist. Tanning was abandoned early, and dyes soon afterwards. Early and adequate treatment of shock by infusions of plasma, a minimal cleansing under morphine alone, dressing with some sterile substance such as vaseline, sulphonamides given by mouth rather than locally, and early transference of those likely to need grafts to a plastic centre, gave the best results.

The third phase of the war began in July 1943. In that month two profoundly modifying factors appeared. First, the theatre of operations was transferred once more to Europe. This meant wet and mud instead of sand, heavily manured terrain instead of sterile soil. It also meant warfare much more static than heretofore, operating in buildings instead of tents, surgery done in organized centres instead of in small rapidly moving and poorly housed groups, the chance to sort casualties and devote groups to the study and treatment of special wounds, the ability to retain serious cases in forward units with all the amenities of a base hospital, and to get the slighter wounds away down the line of

their final destination within two or three days. Secondly, penicillin became available in the combat zone, first in small quantities for trial only, later in adequate amounts.

These factors, wounds more heavily contaminated, better surgical facilities, a more powerful bacteriostatic, and smooth evacuation produced a profound modification of surgical policy towards soft tissue wounds.

Large flesh wounds, large not in surface extent, but in the volume of devitalized muscle they contain, present a special problem. The shock that accompanies them is very resistant to treatment, indeed, the condition of the patient is often found to deteriorate progressively in spite of transfusion till the wound is excised or the limb amputated. The factor of 'toxic absorption' from damaged muscles was once again invoked, but the proof that any toxin is absorbed from such areas is notably lacking in any animal experiments, and indeed in clinical experience till a later period when bacterial decomposition may be expected to account for the toxæmia. It is safer to assume that shock and loss of circulatory volume are the same thing, and to explain the persistent shock in these large muscle wounds by the great capacity of the damaged tissues to absorb blood, so that the loss continues in spite of transfusion. Whatever the cause, it was found advisable, whenever military circumstances made such a step possible, to place special teams in a forward site to operate on large lacerated wounds alone.

In other flesh wounds the practice of delayed primary suture between the third and the sixth day was developed as an article of fixed policy. Such a plan effects a great saving in this important group of injuries, which, if properly handled, should leave no permanent disability. Early suture reduces the call on hospital beds, and the amount of dressings used, it cuts short the period of painful disability, and by lessening the amount of scar tissue, it allows earlier and better function. Where early excision is possible and early suture intended, the first operation must obviously be thorough. The limited wound toilet known as 'trimming' which was the right course in wounds received late and sparsely infected, may give equal safety, but it will not allow equally early closure, only secondary suture when the autolysis of dead tissue is complete. Wound trimming has therefore been succeeded by

careful excision of all dead tissues. Skin is conserved as much as possible, but all damaged fat, fascia, and muscle are removed, some bacteriostatic, either a sulphonamide or penicillin, is applied with the dressing, and the limb is immobilized with a plaster slab for evacuation. Arrived at the base, the time for suture is judged by the notes on the first operation, the condition of the wound and the parts around it, and the bacteriologist's report, but above all by clinical appearances. At the second operation penicillin is given, either locally or parenterally, to the great majority of cases. It was shown that 80 per cent of soft tissue wounds adequately excised in the forward areas can be closed by suture between the third and sixth day at the base, and 90 per cent of such sutures are successful. (From one army it was reported that 25,000 wounds were closed, with primary healing in 95 per cent.) Of the remainder, those which are clinically infected, those in which the skin loss can be made good only by swinging flaps or by grafting, and those in which dead tissues have not been removed completely, the majority can be closed about the third week. In this task of late closure the plastic units played a great part in showing that with increasing experience it is possible to close even large gaps by some form of suture in preference to grafting, thus giving a covering of normal skin with its underlying fat, a better functional covering than the best of grafts.

Where early suture is the aim of the surgeon, the closed plaster method of treatment, valuable though it will always be in certain phases of warfare, is clearly unsuitable, and it can be said to be dead in the present phase of warfare except for the treatment of gunshot fractures below the knee.

It is said that a bad workman blames his tools, but the converse that a good workman praises his, is unfortunately seldom true. These fine results, of which we are justly proud, have been made possible by new therapeutic agents, the sulphonamides and penicillin. These drugs are believed to act by interfering with the nutrition of the parasites and preventing their growth. Nothing can kill bacteria without harming tissues, but these new substances keep them in a state of enfeebled existence till the defences of the body annihilate them. There are thus two essentials in chemotherapy that the agent shall get to every part where the bacteria lie, and that healthy tissues and active

body fluids shall come into contact with the same bacteria. These drugs are ineffective against bacteria in dead or devitalized tissues, or in stagnant cavities such as undrained abscesses. They are useless against *insusceptible* organisms, and they are of little value where foreign bodies interfere with tissue resistance, or where old age or enfeeblement prevent the formation of anti bodies.

Penicillin is to-day the wonder drug, the great contribution of British scientists to the allied cause and to the welfare of mankind. There is a real danger that a penicillin minded generation may forget that the results they see are not those of penicillin, but those of Nature aided by penicillin, that if penicillin allows delayed suture of wounds with a high proportion of success, success only slightly less was obtained with sulphonamides before the advent of penicillin, and in the last war surgeons were able to close many wounds without any form of chemotherapy.

In comparing the two methods, it must be remembered that penicillin is a luxury method, compared with which sulphonamides are cheap, stable, compact, easily administered, and fool proof, conditions can easily be imagined in which the distribution and administration of penicillin in the forward areas could break down completely. Short of a complete rout, no military difficulties would *interfere* with the universal use of the sulphonamides. Further, there is little evidence from reports published by British and American surgeons that penicillin has any decisive value in the primary treatment of wounds in the forward areas, that early suture is much easier or more successful in wounds so treated after excision, or that it has appreciably affected the incidence or mortality of gas gangrene. It has, however, done no harm, except where it has led the surgeon to neglect the proper surgical treatment of a wound or lulled him into a sense of false security. Its great value in war surgery is in four conditions:

1. To allow major surgery and immediate closure in circumstances of doubtful sterility in wounds where drainage must be avoided. Cranial wounds, particularly those communicating with air sinuses, joint wounds and wounds of the chest and abdomen, come into this category. Compound fractures of the long bones which without penicillin can never be closed with safety, may, in selected cases and in favourable situation, be closed with penicillin.

busy surgery, and meet his friends and rivals over a *co* or a glass of sherry, and—equally important—his wife can the wives of his friends and rivals. Misunderstanding cleared up, suspicions and animosities melt away. If a good d follows, and an easy address and discussion, many men wil themselves ready to get up and speak freely of their exper without that reserve or uneasy boastfulness that affects the many of the formal discussions. Thus the social functions medical society lead naturally to the educational, because wi a broad and tolerant frame of mind a doctor cannot be edu or, rather, he cannot educate himself.

True education is personal experience built up by trial contemplation into a personal fabric of knowledge and wis. We are taught by books and lectures, we learn—that is, at into our intellectual structure—what we find out for ourse or think we do.

A man who writes a book or a man who gives a public lec is committing his reputation to cold print, or to the ear critical strangers. He must, above all, be accurate. He ca give expression to those half formed ideas that are uppermo his waking moments, to those dreams that he hopes will one become realities and shake the world. His facts are as clear as the pyramids, because they have stood the test of time, arguments are unshakable, because they have been shaker repeatedly in the winnowing process of preparation that have assumed a static form and a set order, his conclusions ar right as rain—and about as wet. Such books, such lectu flow over our minds like water over the bed of a river, somet impinging on them so forcibly as to change the direction of d channel, usually doing no more than produce a temporary pleasant turbulence. But it is in discussing the book with frer in the debate of small groups before the lecture starts, or in arguments after it is over in which the lecturer, a *changed* s once he has stepped from the platform, takes part, that we fir out those beliefs that will remain with us and guide us in years to come. It is in the sharing of inspirations yet untest in defence or attack of theories struggling for definition, d learning is advanced and ideas are born.

19 THE PLACE OF MEDICAL SOCIETIES IN THE DOCTOR'S LIFE¹

(*Lancet*, 1946, 1, 525-26)

LOCAL medical societies, some of them nearly two hundred years old, are a peculiar feature and a particular glory of British Medicine. Why were they formed, and what need do they satisfy? The doctor has his family circle, his friends, his golf clubs and his social clubs to enliven his hours of leisure. He has his books and journals, the British Medical Association, the Royal Society of Medicine and the Medical Society of London, the many lecture courses which are open to him at the colleges, and the refresher courses which hospitals organize for his benefit, to give him instruction. He has all these, but a medical society supplies something different. It fills a spiritual need that is otherwise unsatisfied. It offers corporal and intellectual sustenance of a kind that cannot otherwise be obtained.

therapy, with a great saving of time and improvement in function.

2 In the treatment of established infections due to penicillin-sensitive organisms The route by which penicillin is administered in such cases must be chosen to secure its greatest concentration at the site of infection

3 In the early and secondary closure of war wounds

4 In secondary operations on wounds which have been or still are infected With penicillin the cleaning up and bone grafting of ununited war fractures may be antedated by months, and the eradication of septic tracks may allow a necessary nerve suture to be performed

I have sketched the progress of surgical thought and practice in this war, but if I were to try to express the difference between the place of surgery in this war and other wars, I would say it is that surgery has not gone to war alone If we were to jump into an aeroplane and visit an advanced surgical centre we should find a group of young men operating on the wounded, many of them specialists in one branch or another of surgery, and with them expert anaesthetists using the most modern apparatus, in the wards we should find the physician studying a group of chest wounds, a research team making observations on shock or vascular injuries, a field transfusion officer shepherding shattered men through the valley of the shadow, a penicillin officer seeking ever to improve the methods of administration, a pathologist investigating the bacterial flora of wounds In this team spirit we have gone from good to better, till to-day we expect in the injuries of head, chest, and abdomen a recovery rate twice that of the last war, in soft tissue wounds healing almost as early and as free from scar tissues as in the wounds of civil surgery So satisfactory are the results that we may be in danger of forgetting that we are only helping the tissues to fight the battle at which they are so expert, not fighting it for them

19 THE PLACE OF MEDICAL SOCIETIES IN THE DOCTOR'S LIFE¹

(*Lancet*, 1946, 1, 523-26)

LOCAL medical societies, some of them nearly two hundred years old, are a peculiar feature and a particular glory of British Medicine. Why were they formed, and what need do they satisfy? The doctor has his family circle, his friends, his golf clubs and his social clubs to enliven his hours of leisure. He has his books and journals, the British Medical Association, the Royal Society of Medicine and the Medical Society of London, the many lecture courses which are open to him at the colleges, and the refresher courses which hospitals organize for his benefit, to give him instruction. He has all these, but a medical society supplies something different. It fills a spiritual need that is otherwise unsatisfied. It offers corporal and intellectual sustenance of a kind that cannot otherwise be obtained.

The functions of a medical society are social and educational, and of these the first is undoubtedly the more important, because it leads naturally to the second. Doctors are all members of the same ancient and honourable profession. They are also rivals in the same anxious and onerous business, often overworked, and at the end of a day overtired and prone to shut themselves in their own houses, sometimes with fancied grievances against a brother practitioner over some misunderstanding which has never seen the light of personal encounter. Unity and friendship among the doctors of a district is most easily brought about by the pleasant and free intercourse which a well conducted dinner meeting of a medical society provides. Here they can meet without the formality that marks the gatherings of a larger body, the majority of whose members are strangers to each other. Here they can discuss medical matters to their hearts' content without the guilty feeling, always present at a non medical party, that they are talking shop. Here the practitioner can repair after he has finished his

¹ Presidential address at the first meeting of the Mid Bucks Medical Society, January 13th 1946

busy surgery, and meet his friends and rivals over a cocktail or a glass of sherry, and—equally important—his wife can meet the wives of his friends and rivals. Misunderstandings are cleared up, suspicions and animosities melt away. If a good dinner follows, and an easy address and discussion, many men will find themselves ready to get up and speak freely of their experiences without that reserve or uneasy boastfulness that affects them at many of the formal discussions. Thus the social functions of a medical society lead naturally to the educational, because without a broad and tolerant frame of mind a doctor cannot be educated or, rather, he cannot educate himself.

True education is personal experience built up by trial and contemplation into a personal fabric of knowledge and wisdom. We are taught by books and lectures, we learn—that is, absorb into our intellectual structure—what we find out for ourselves, or think we do.

A man who writes a book or a man who gives a public lecture is committing his reputation to cold print, or to the ears of critical strangers. He must, above all, be accurate. He cannot give expression to those half formed ideas that are uppermost in his waking moments, to those dreams that he hopes will one day become realities and shake the world. His facts are as clear-cut as the pyramids, because they have stood the test of time, his arguments are unshakable, because they have been shaken so repeatedly in the winnowing process of preparation that they have assumed a static form and a set order, his conclusions are as right as rain—and about as wet. Such books, such lectures, flow over our minds like water over the bed of a river, sometimes impinging on them so forcibly as to change the direction of their channel, usually doing no more than produce a temporary and pleasant turbulence. But it is in discussing the book with friends, in the debate of small groups before the lecture starts, or in the arguments after it is over in which the lecturer, a changed man once he has stepped from the platform, takes part, that we thrash out those beliefs that will remain with us and guide us in the years to come. It is in the sharing of inspirations yet untested, in defence or attack of theories struggling for definition, that learning is advanced and ideas are born.

This problem of self-education is one that faces each of us

individually. It is one that I had to face when I found myself standing on the high-diving board of surgical registrar, reasonably secure, poorly but regularly remunerated, happy in the consciousness of honours and higher degrees recently gained, and looking down on the cold and opaque waters of surgical practice into which I must now plunge. How could I transform myself from a surgical oracle to whom students must listen into a wise surgeon whom doctors would wish to consult? I could never read one hundredth of the books on the shelves or the journals on the tables, I could never listen to all the lectures or visit all the great men. I could seek self-education only by co-education, by personal discussion, by learning from others what they had read and heard and imparting to them my gleanings. I must join a surgical club. But I found that all existing clubs included surgeons of all degrees of seniority, and I knew only too well the gulf that separates men of different ages and standing, and prohibits that almost wordless transference of mental and spiritual emanations that form the basis of true friendship and true education.

With a few friends I started a new club, the Surgical Travellers, whose aims were simple. It must be large enough to secure the respect and attention of centres we proposed to visit, but so small that all could see in an operating theatre, all could hear at a bedside discussion, all could lodge at the same hotel, and all could discuss what they had seen and heard in the evening, the number we chose was fifteen. The members must represent the widest field of medical schools. And all must be of comparable standing and seniority. This little university, for a university is an association of students for mutual benefit, met in most of the cities of Britain and many of the capitals of Europe between the two wars. It enabled its members to grow up together, to draw strength from each other's enthusiasms, to mitigate each other's failings. To each of us it has been a constant source of *spiritual refreshment, and the affection in which we hold it* to-day is an index of what we have learned from it. I say with some pride that of those fifteen who got together long ago, four are now professors of surgery and eight have been consultants to one of His Majesty's Services.

That personal discussion can dispose in a few minutes of

once the indispensable man of insight has perceived a crack in the wall of ignorance it does not require genius, but only weight and size, to knock a hole in it. States can provide the mass attack, and in the future it will be their business to do so, but they must beware lest the essential genius of discovery, which will always be individual and unpredictable, be overlaid among committees and strangled by red tape. Red tape is essential to organization. It is as much a part of a state scheme as the rigging of a ship, which holds up the masts. We must see to it that the rigging is limited to that which is needed to provide an efficient sail plan, that it is as light as correct design and modern materials will allow, that it does not set up windage and hinder progress. We must see to it that the ship itself is on the right course and under the right direction.

Bureaucracy, by its very nature, tends to go beyond its mandate. Its job is to regulate, and it is thus apt to love regulation for its own sake, to look on rules as the end rather than the means of administration. There is the constant danger that it may rule out discovery itself. As a bureaucracy kills with its rules, so a committee may crush with its dogmatism. All committees run to dogma, largely because they consist of several persons obliged to agree on one decision. These persons, if they have any opinion at all, must *differ in some part of the matter, and commonly* agreement can be found only in what is called a broad ruling, that is, a lowest common denominator founded on some idea derived, not from individual experience, but from an instruction in which all have been brought up—that is, a dogma. And since authoritative committees usually consist of persons of mature age, these dogmas are often out of date.

We must remember, too, that the innovators and geniuses of this generation are likely to become the doctrinaires of the next. For science moves, and none can predict the direction of its movement, and in the tide of scientific change the problems of control are more those of the navigator who explores perilous seas, than of the lawyer who drafts a bill or the dictator who imposes a regime.

difficulties that remain unsolved after months of correspondence is a commonplace

There is need, then, for local medical societies, and they have arisen to fill that need, they flourish and remain if they continue to fill that need. They must be broad in their aims, their *interest*, and their membership. They must avoid every political flavour, not only medical or party politics but the attempt to secure unanimity by persuasion, or to use numbers to gain an objective. They must never tend to represent one group of doctors or one section of practice, to foster the reputation of a particular hospital, to push the interest of one town or district, to negotiate for financial terms, or to run any kind of sectional racket. Their aims should not be too clearly defined lest their growth be interfered with and its free blossoming fail on account of the roots being pot bound. At their meetings, all should be encouraged to take part. The senior practitioner can contribute a wealth of wisdom from his long experience, the youngster can recount what they are saying in the hospitals. Your old men shall dream dreams and your young men shall see visions. Medical Societies should not meet too often, and at one of the meetings there should be an address by a non medical speaker—a journalist, a lawyer, a traveller, a manufacturer. Their geographical area should be left vague, and room should be allowed for growth. Limitations will come and procedure will be laid down, but these should come by tradition and not be deliberate planning. If they shape themselves as the natural expression of the desires and needs of the practitioners of a district, they will have the native strength of all things that have grown naturally

States of native strength possessed,
Though very poor, can still be very blest
And self-dependent power can time defy,
As rocks resist the billows and the sky

(*Practitioner*, Vol 161, No 961, July 1948, p 1)

THE most profound change for the world in the last eighty years has been in the progress of science, not only in its methods, but in its reach. The reach of science has extended in both directions, in the precision of minute analysis, and in the application of discovery. Factories are now organized on a scientific basis, each has its research department, and the laboratory investigations of to day are the basis of the full scale production of to morrow. Clinical medicine is no longer a matter of impressions, but is based on the results of statistical inquiry, not into single cases, but into thousands compared and classified. Pharmacy, relying on the medicinal properties of crude drugs of vegetable or mineral origin, has given way to chemotherapy by pure substances refined by extraction or prepared by synthesis, each selected for a particular action on the body or its enemies, and blue printed to exercise that effect.

It is a commonplace that scientific discovery, proceeding ever at greater speed, has transformed all political issues. A nation that does not use science, both for research and production, will soon be unable to feed, must less to defend, itself, for it will neither be able to compete in the world's markets nor give its people the standards of life they demand. It may be predicted that even an iron curtain will not always hide from any people their own relative hardship compared with those who are more advanced. And medicine, which has always demanded some degree of centralized control, has more to gain even than industry from organization designed to subsidize clinical and laboratory research.

Organization must come, in all states and in all sciences. The situation must be accepted, but in that situation, as in all political situations, there are great dangers as well as great opportunities. Organization is no substitute for genius. No amount of bureaucracy could have discovered penicillin. But

¹ Part of an editorial on the eightieth birthday of the *Practitioner*, which coincided with the introduction of the National Health Service Act.

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‘NO pleasure is comparable to the standing upon the vantage ground of truth’ says Bacon in his well known essay, as if truth were indeed a fixed peak whence, having at last reached it, we could look round upon the plains of uncertainty and the chasms of error. If it were so, would men spend their lives and energies to discover it, or shed their blood to defend it?

When we speak of truth we indicate an opinion and admit the possibility of another opinion, but while allowing that the matter is open to discussion, we imply that, among reasonable men, such discussion can lead only to the conclusion to which we ourselves have been led. In matters of facts, in which no divergence of opinion is possible, we talk of accuracy. In matters of the emotions, such as poetry or music, in which the criterion is one of individual sensibility, we should use words of praise and speak of excellence or beauty rather than truth. We select the word truth as particularly applicable to those objects of deliberation which are open to argument, while they are open to argument, and when the argument is nearly but not quite settled. Evolution was an interesting theory or a heresy to Darwin’s contemporaries, a truth to his successors, a fact to us. But there are whole realms of thought, such as religion, economics, and politics, in which the basis or argument is not a set of facts, but a set of assumptions about the nature of man and the universe. In these regions truth can never pass from the pedestal of adoration to the glass case of acceptance, it will remain the truth only as long as those basic assumptions are the belief of the majority of mankind, and when they are displaced it must give way to a new truth.

It follows, therefore, that there is no such thing as absolute truth. Truth is for each of us something personal, something that we have tested and accepted, and which we are prepared to defend. But while truth is of our discovering it is not of our making. When we set out to find truth we must do so with a pure heart and humble spirit. We must apply to each new fact or theory that presents itself to us for acceptance the same exact

¹ By permission of *Surgery Gynaecology and Obstetrics*

and impartial methods of test and trial, and we must be ready to accept the verdict of those tests. We must be prepared for anything and be prepared to meet it fearlessly. For the truth, when we see it face to face, may not be in the guise we imagined, it may override our most cherished theories, upset our hopes, even smash our careers. No great man has pretended that truth is kind or friendly. It has been described as naked, as blindfold, as a flaming sword—never as a cook housekeeper or a woolly waistcoat. We are told 'the truth shall make you free,'—not happy, we are told 'great is the truth and it shall prevail,'—it, not you. Yet there is something in the vision, in the discovery, in the possession of truth, cold and uncertain though that possession may be, that has inspired the noblest spirits of all times to forsake everything to become her followers. 'Beauty is truth, truth beauty,—that is all ye know on earth, and all ye need to know.'

In surgery we are constantly engaged in the search for truth. We wish to know about the origin of disease, about its progress, about its vulnerability to the many alternative weapons with which we seek to attack it. We devote our days to the practice of our work, our nights and our leisure to its study. But the problems we attack are long and difficult ones and the possibilities of error are many. Noxious agents vary in their action and human beings in their reaction to them, even in groups that appear strictly comparable in age, sex, physical habitus, occupation, and environment. Surgical treatment cannot be reproduced in different centres with the exactness of chemical experiments in different laboratories, for surgeons vary in skill, temperament, and in their selection of material. We cannot hope to settle, or even to form an opinion on, more than one small aspect of the problems we attack in a lifetime. We should not for this reason be discouraged from seeking the truth ourselves, for truth is revealed only to the constant inquirer, but we must leave much of this inquiry to others. We must then choose between the conclusions of many men working at the same problem in different lands. Where does truth lie? Not in numbers, for a small series carefully observed and recorded by a critical expert may mean more than several hundreds furnished by a team and analysed by slide rule. Not in the magic of a name, for truth

may lie in the contribution of the small town practitioner, penned apologetically and hidden in the pages of a little read journal, rather than in the figures hammered out by platinum secretaries in the chromium laboratories of the million dollar professor. We must judge others, and the basic problem seems to be this—how to recognize truth when we see it.

We have already agreed that truth being a matter of intense conviction rather than exact proof, it can be reached by the spirit rather than the intellect, so we shall find truth in others by spiritual affinity rather than by intellectual analysis. The more we cultivate truth ourselves, mix with truthful men, test the accuracy of our words before we speak them and of our writings before we let them go abroad, develop in our consciousness by the study of writings that time has shown to be redolent of truth, not alone those of surgical masters but of all great men, an orientation that will lead us to truth as the homing pigeon is led to his own cote, the more certain will be our instinct, the more direct our intuition. Blessed are the truthful, for they shall see truth.

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